The Electrical Industry's Weekly Magazine December 25, 1961

Electrical World

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1961 YEAR-END REPORT

Shows Federal Government Reaching for More Influence in Power Industry . . .

Utilities Manufacturers Affected

See Management Newsletter . . . . . page 41

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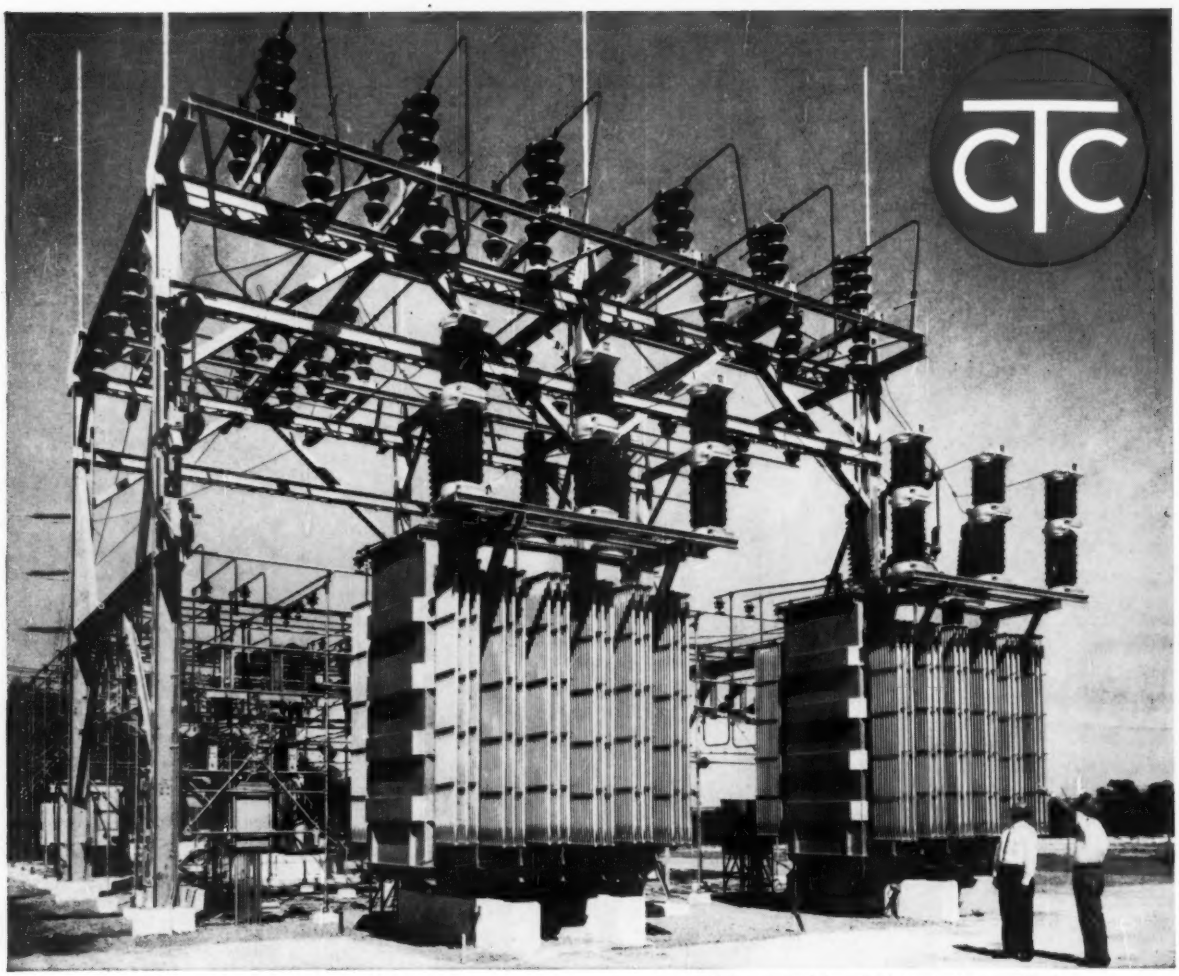

William H. Rutledge, district supervisor, and R. L. Johnson, administrative assistant, of Florida Power & Light Company inspect new South Daytona Beach sub-station installation.

CENTRAL POWER TRANSFORMERS

IN SERVICE AT FLORIDA POWER & LIGHT COMPANY'S SOUTH DAYTONA BEACH SUB-STATION

Fast-growing Florida's need for more electric power is being served by sub-stations such as the one shown above, located near South Daytona Beach. We are proud that two Central 7500 Kva transformers were chosen for this installation. The rating of these Central power transformers is 115,000 volts delta primary to 13800Y/7980 secondary.

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Electrical World

DECEMBER 25, 1961
Vol. 156, No. 26

Dateline . . .

New Hanford Proposal May Clarify Issues Involved

Hanford, Washington—The proposal to generate electric power at Hanford, which met an unexpected demise at the hands of the last session of Congress, may yet come back to life. The question is, how will it be brought back?

In Washington, D. C., the word is that federal Hanford generation will stay dead. The Atomic Energy Commission, which last year was the federal sponsoring agency, right now has no plans, according to insiders, to try to get construction money for the generators in its fiscal 1963 budget.

And Interior Secretary Udall, who sometimes speaks for the President on electric power matters, was recently quoted as saying, "I don't know anyone arguing we ought to press again" for federally-financed Hanford generation. Instead, he was reported to have said, it was more likely that the Administration would favor AEC approval of Hanford generation by a non-federal public body.

Here in the Pacific Northwest, the situation is viewed a little differently. In the first place, that Hanford will live again and be built doesn't seem to be very much in doubt. Washington Governor Albert Rosellini, who is credited with a high degree of political astuteness, put this feeling into words recently. "It's just a question of time" before generation is installed. If the federal government doesn't build the plant, "some other agency" will, he stressed.

As to federally-financed generation, there is some speculation here that Washington Sens Henry Jackson and Warren Magnuson may introduce a bill to take the blush away from their political faces. This bill would be somewhat different from the last one, to permit legislators who voted "no" to have a reason for switching.

But there is also a line of speculation that is more in tune with the thinking in the nation's capital. That is that a federally-financed Hanford project would be politically dangerous to resurrect. Having been burned once, Northwest legislators would not want to have their names associated again with an issue whose political aspects are more clear than its economic ones.

(*Continued on page 5*)

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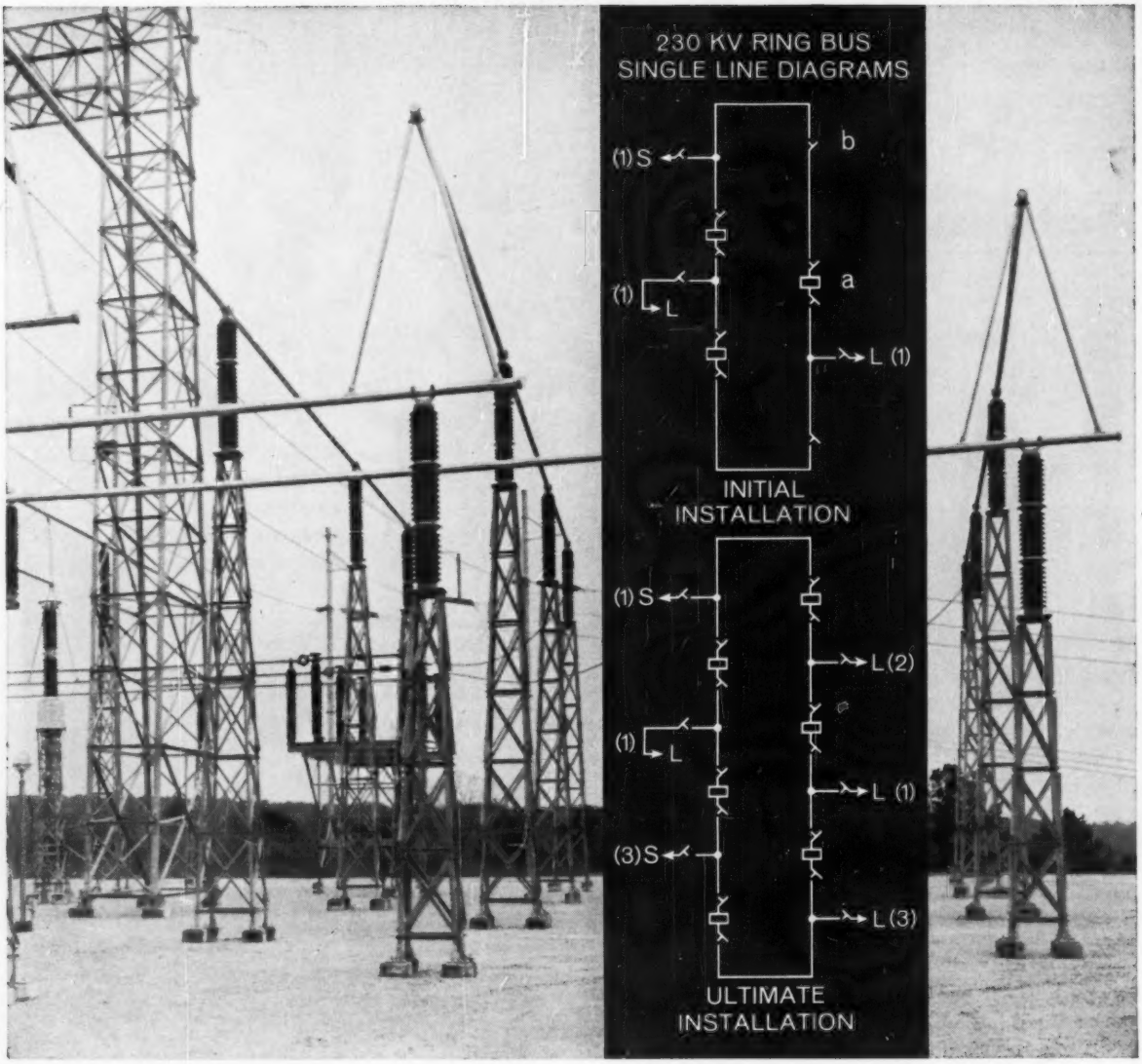

Spend less now... expand later *without interrupting service*

How? By designing Alcoa® aluminum rigid ring bus into your next switching station.

Like this one—the Goat Rock Substation—engineered by Georgia Power Company of Atlanta. As a key station in the utility's system, this substation was given unusually thorough engineering review. Nothing less than the best in design and material could be considered.

Even a quick look at the diagram will show how easy it is to add source or load lines without interrupting service. In the initial installation, one source line energizes a ring bus from which two loads are supplied. To add a third load (2), open the breaker "a" and switch "b". In this way the additional breaker and isolating switch can be installed without any high-voltage hazard to construction personnel.

Further expansion involves adding a new source line and a fourth load line (3). This will be accomplished in the same manner as adding load line (2). Naturally, bays must be constructed for installing lines at (3).

That's the story: Reliability, expansion without interrupting service, lower initial cost. All accomplished with Alcoa aluminum rigid bus.

More facts? See your usual source of Alcoa materials. Or write to Rome Cable Division of Alcoa, Dept.1-121, Rome, New York.

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Dateline . . .

Hanford, Washington (*Continued from page* 3)

As a result, most attention is now being centered on a proposal for a non-federal Hanford project. Washington Public Power Supply System, a group of 16 PUDs in the Northwest, has proposed to AEC and Bonneville Power Administration that negotiations begin toward the building of such a project. WPPSS would build the generating plant, AEC would supply the waste heat, and BPA would buy the power (EW, Dec. 11, p 51).

If nothing else, the WPPSS proposal serves to keep the Hanford issue alive without demanding a showdown during the next session of Congress.

The interesting part of this proposal stems from the fact that WPPSS would finance the project with commercial money, which means that the heretofore nebulous economic issues would have to be delineated accurately.

To do this, WPPSS would have to get some sort of guarantee from the AEC as to the availability of heat (or alternate power source) and an equally firm commitment from BPA to buy the power. Assuming this could be done, which is not at all presently clear, the final decision on such a non-federal Hanford project would be at the hands of the Wall Street underwriters, not the Northwest politicians.

Going one step further, this Wall Street decision would sharpen both the economic and political issues. A Hanford project commercially feasible would also be attractive as a federal project. The government would already be in on two phases of it, supplying heat and buying power. If not commercially feasible, Washington lawmakers would have to redefine the issues involved for federal financing, perhaps dropping the subject altogether.

The Northwest, therefore, and especially WPPSS, may find that, in bringing the "inevitable" project back to life, it will be forcing everyone to look at the project more rigorously than ever before.

Letters

Another Substation Data Logging Installation

To the Editor:

In connection with your article on Substation Data Logging which appeared in the issue of November 27, 1961, you might be interested in our installation, which, while not completely automatic, does qualify as a remote substation data logger and is certainly among the first such installations, having been placed in service in April, 1961.

We can log in our load dispatching office all watt, var, voltage, and transformer tap position readings from the three major substations supplying St. Petersburg.

The dispatcher calls for the desired reading by manipulation of a selector switch and a push button. Print out is on a Clery Printer which prints a numerical code point identification, on the same line with the quantity read. We installed the manual system initially in preference to an automatic system in order to gain some experience before deciding just what form of automation would be best suited to our needs. The addition of a programing unit and the associated selection relays to the existing equipment will be a relatively simple matter.

This system was installed in connection with a supervisory indication and alarm system, and operates entirely over microwave, except that one of the three stations is reached by a combination of microwave and company-owned underground telephone cable.

The points read, for the three stations are:

Total	Amps	Watts	Vars	Volts	Trans. Tap
64	0	24	24	12	4

W. B. Simonds
Chief System Operator
Florida Power Corporation
St. Petersburg, Florida

▶ Our thanks to Reader Simonds for filling out the rapidly-changing picture of substation data logging installations.

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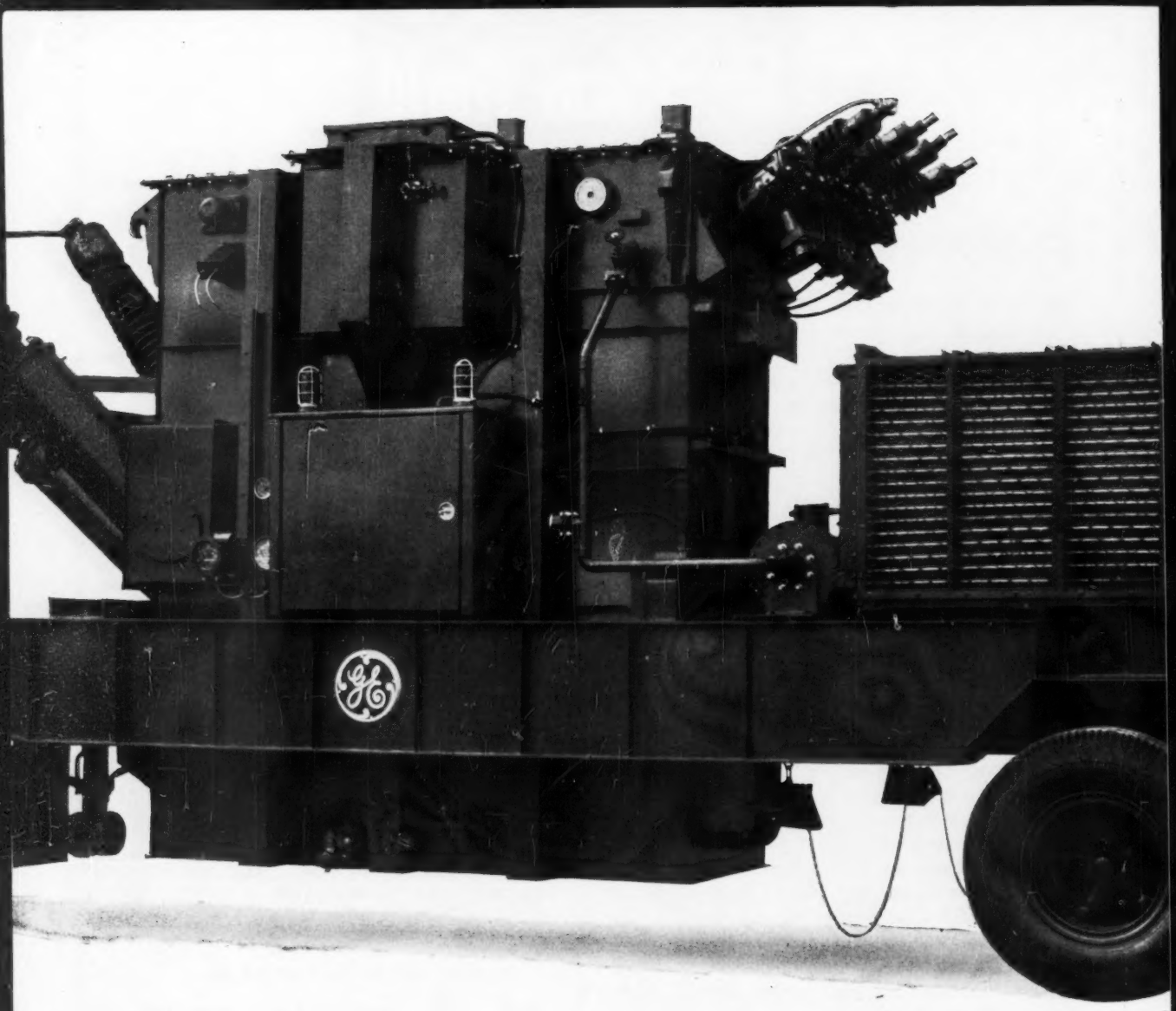
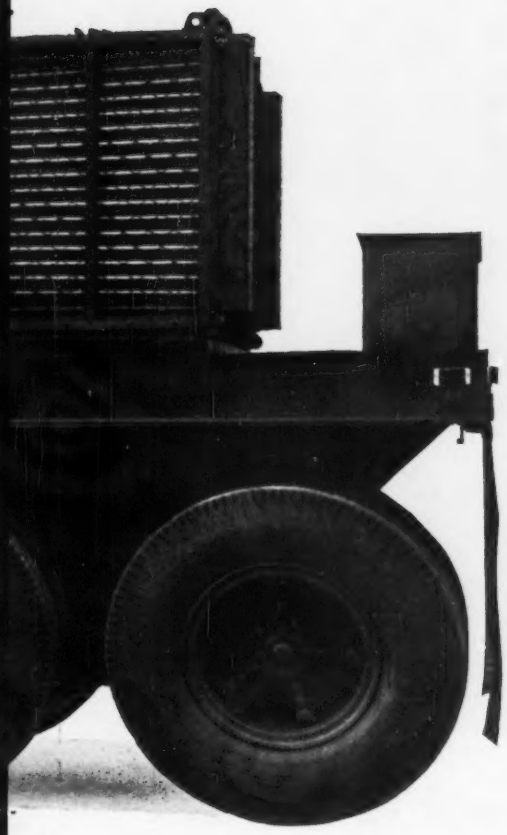
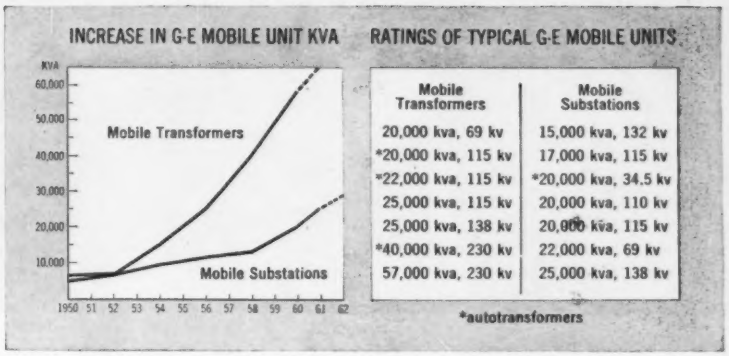


MORE AND MORE KVA ON WHEELS





100,000 kva on wheels? It may well be possible—*soon.* Pioneering design innovations by General Electric are pushing the limits of mobile capacity far beyond those envisioned only a few years ago.

Mobile substations rated as high as 25,000 kva and mobile transformers up to 57,000 kva are already in service or on order from General Electric . . . and even larger units are yet to come.

This progress means you can now multiply the economies of mobile units by extending their application to include even the larger substations on your system. Behind this ever-increasing capacity are such major G-E advances as these:

• **75C operation,** permitting 25 percent more capacity than the conventional 55C operation. Thermally superior Permalex® transformer insulation permits operation at the higher winding temperatures with normal transformer life expectancy.

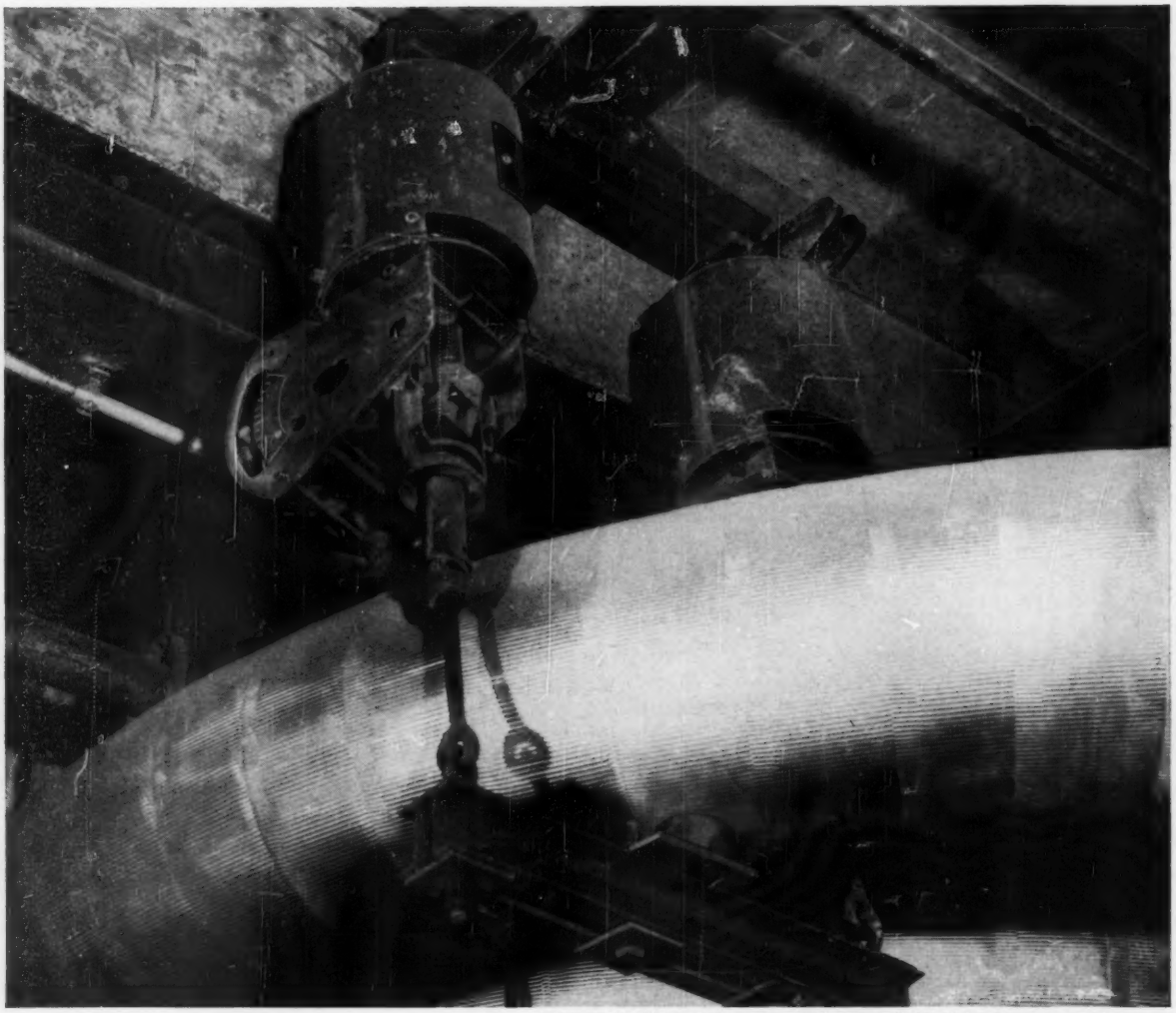
• **Reduced insulation levels** (BIL) permit even more dramatic gains. For instance, a two-step reduction in high-voltage BIL of a 138-kv unit means up to *67 percent greater capacity,* with no increase in size or weight.

• **New lightweight internal switch** saves as much as 3500 pounds in over-all weight, increasing available capacity.

Through such innovations, General Electric continues to lead the industry in providing more and more mobile kva per pound on the road to match your growing loads. For full information on high-capacity mobile substations and transformers, contact your G-E Sales Engineer. Or, write General Electric Co., Section 422-45, Schenectady 5, N. Y. *Power Transformer Dept., Pittsfield, Mass.*

Progress Is Our Most Important Product

GENERAL ELECTRIC



Space-saving Grinnell Hangers snugly support hot piping in cramped places.

Hot-to-handle piping . . . little space to spare . . . both problems solved with Grinnell Pipe Hangers

Grinnell Hanger assemblies support feedwater piping at 500,000-kw. power station

American Electric Power Company's 500,000-kw Philip Sporn Station, Unit No. 5 at New Haven, West Va., is one of America's largest power stations. The feedwater piping from the heater to the steam generator presented especially difficult heat and space problems for pipe supports — problems solved by Grinnell Pipe Hangers.

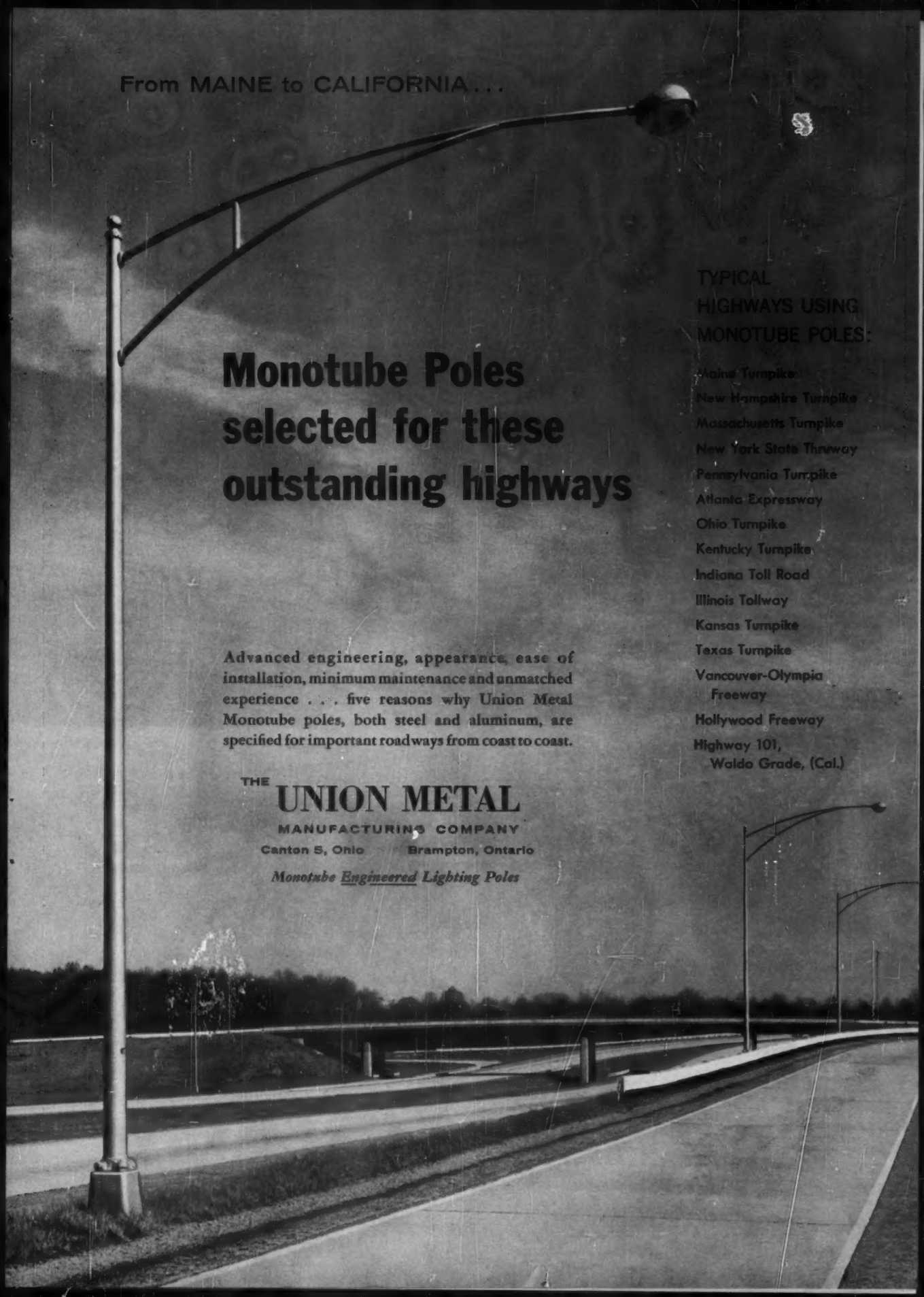
The 14-inch feedwater piping — with walls 1-13/16 inches thick — heats up to 560°F . . . takes pressures up to 4860 PSI. What's more, the piping runs unusually close to ceilings and beams!

To keep reactive forces at terminal points within specified limits, space-saving Grinnell Constant Support Hangers are used. Where piping is subject to vertical movement but does not require a constant support type, Grinnell Variable Spring Hangers are used. In fact, more than 1700 Grinnell Hangers were engineered for the Philip Sporn Station!

Grinnell can solve *your* pipe support problems, too. Grinnell designs, manufactures and supplies a complete line of pipe hangers and supports . . . offers design assistance and field engineering service. Write Grinnell Company, Inc., Providence 1, Rhode Island.

GRINNELL

AMERICA'S LEADING SUPPLIER OF PIPE HANGERS AND SUPPORTS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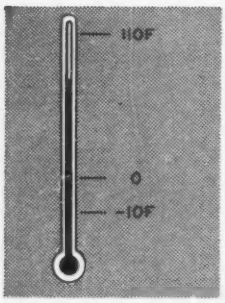
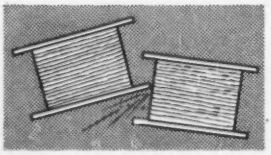
CABLE TALK

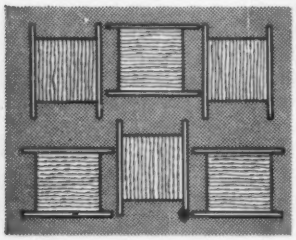
6 tips to help you make the most of your investment in wire and cable

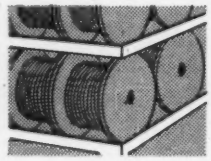


1. Avoid extreme temperatures –below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the potential service life of stored cable. Thermoplastic components may soften and flow; rubber and many other materials undergo chemical and physical changes at high temperatures. You can avoid this problem by not storing cable near heating units, steam pipes, etc.

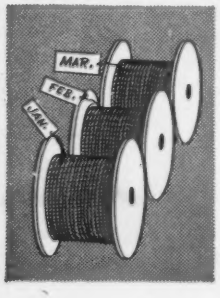


2. Avoid mechanical impact and crushing. Wire on a reel can be rendered useless by allowing the flange of another reel to crash against it. Arranging the stored reels in a crosshatch pattern is the simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.

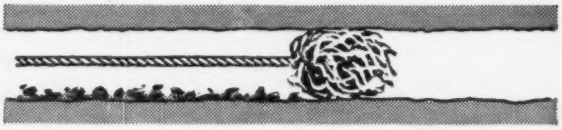




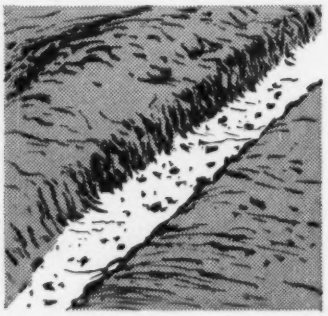
3. Use the oldest stocks first. Very few materials improve with age, so the sooner you use stored cable the longer it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire
A remarkable amount of abrasive material–nails, glass and such–can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.



5. "Direct burial" doesn't mean "on top of anything"
The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable
When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems–and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1-EW. 61304U

ASK THE MAN FROM

ANACONDA®

FOR TECHNICAL ASSISTANCE ON WIRE AND CABLE PROBLEMS

S & C power fuses are going places

The power fuse has come a long way in fifty years —from S&C's liquid fuse to S&C's sophisticated, boric acid fuse of today. Now, with interrupting ratings up to 1,000,000 kva in the Type SM (720 amperes continuous), and 2,000,000 kva in the Type SMD (540 amperes continuous), S&C power fuses are being adapted to virtually every conceivable system protection need. Power fuses are used indoor and outdoor; enclosed and in the open; in plants and buildings; on transmission and distribution lines; on overhead poles; in pad mounted gear; and in underground vaults. These fuses provide predictable protection with simplicity and economy. That's why they are going places.

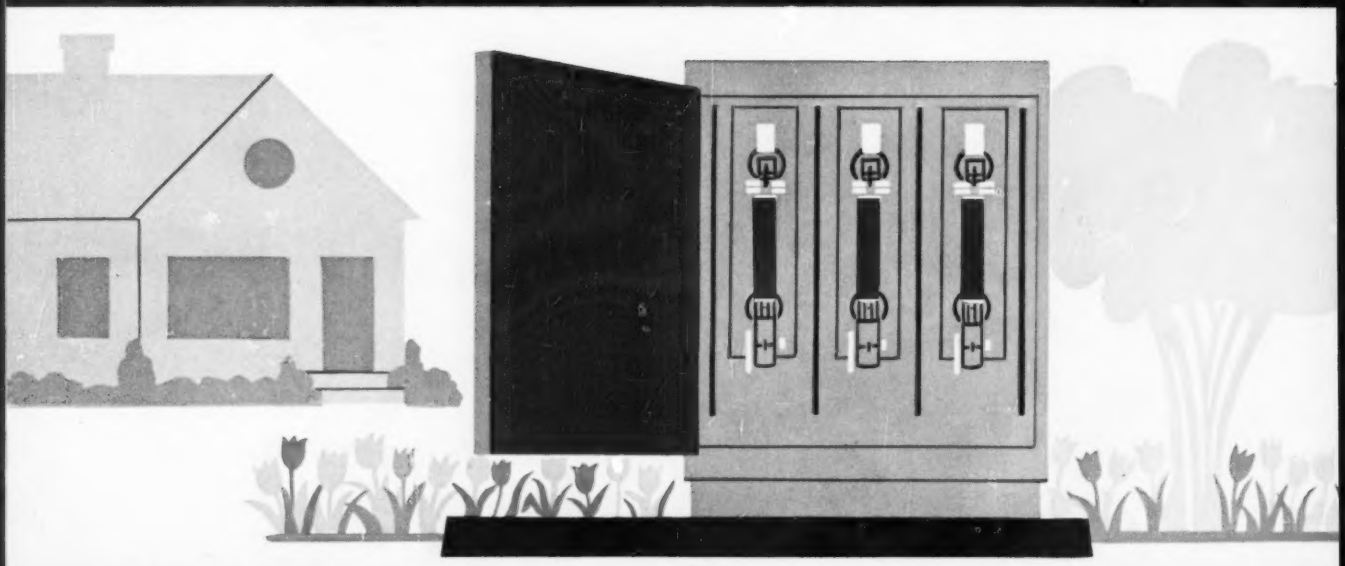
S&C

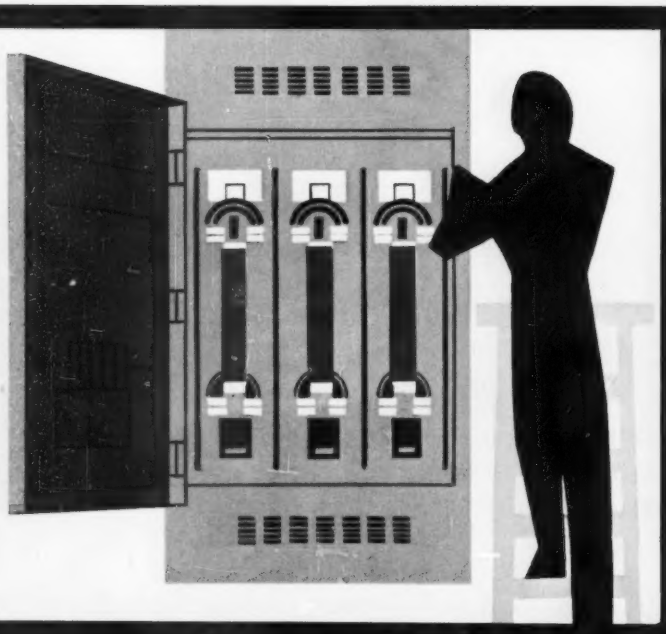
OUR GOLDEN JUBILEE

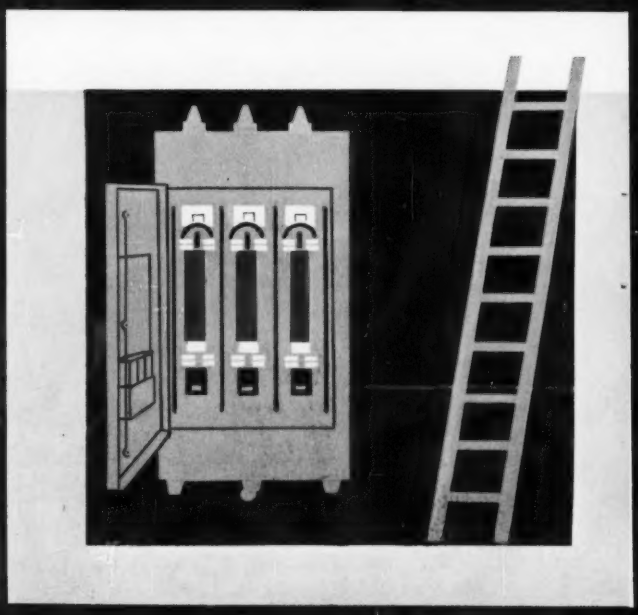
Places like these:

IN PAD MOUNTED GEAR

At sectionalizing points or connected to pad mounted transformers, S&C power fuses protect (and even switch) residential underground circuits—in air. The wide choice of fuse ratings enables the utility to uprate its underground system to accommodate future growth needs.







ON WALLS

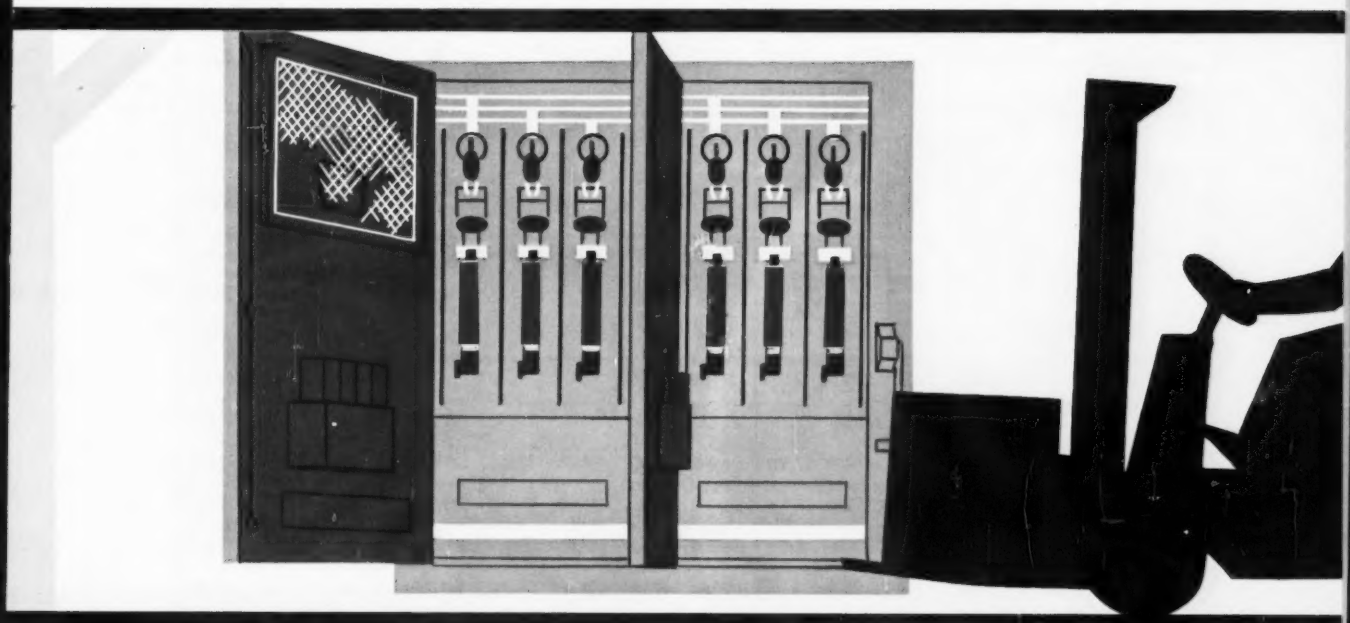
Now you can hang 500,000 kva on a wall with S&C's line of high-voltage metalclad fuses. These compact units conserve valuable floor space while providing fully adequate high-voltage fault protection on industrial and commercial power circuits.

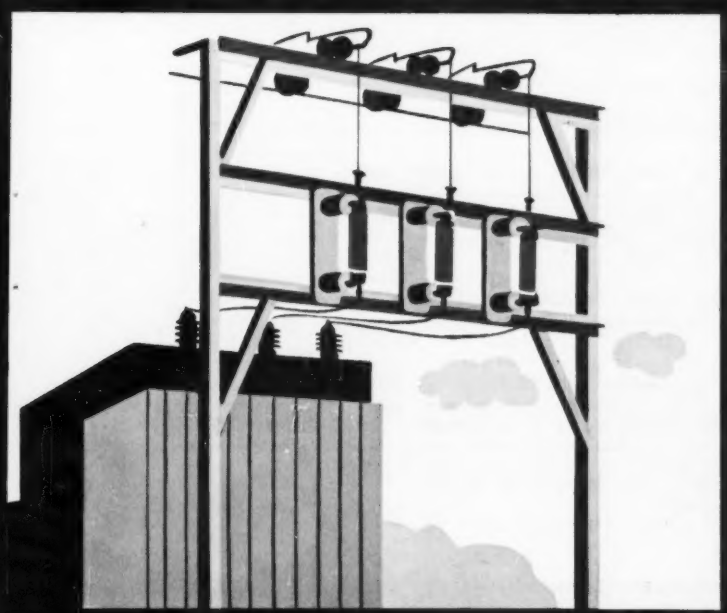
IN VAULTS

Newest addition to S&C's metalclad fuse line is the submersible style for use in vaults or basements where flooding is a possibility. Rated at 4.8 and 14.4 kv, these units carry 200E or 400E amperes continuous, and have interrupting ratings up to 500,000 kva.

IN PLANTS AND BUILDINGS

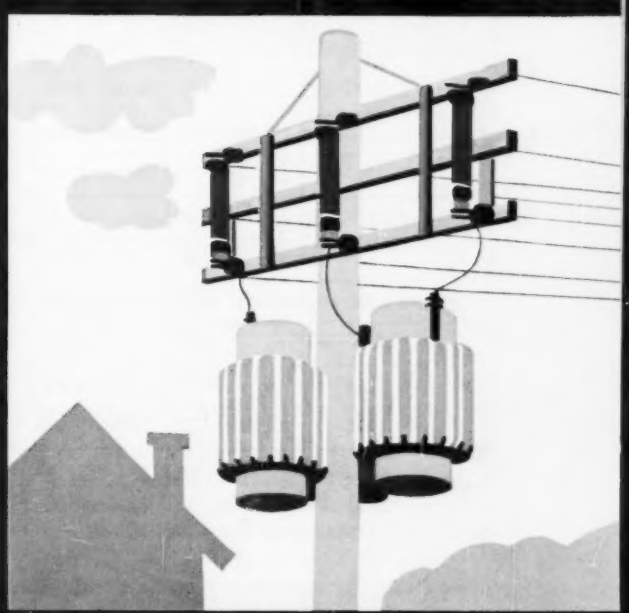
Power fuses, combined with load interrupters and packaged as S&C Metalclad Switchgear, cut protection costs in half by replacing circuit breakers. Power fuses provide needed protection against permanent destructive faults encountered on industrial and commercial high-voltage circuits. (Load interrupters do the switching.)





IN SUBSTATIONS

The 1,000,000 kva interrupting rating (at 34.5 kv) of S&C's Type SM Power Fuse has made it first choice for protection of large power transformers in distribution substations. This means low-cost, maintenance-free protection against primary and secondary faults, without main line outages.



ON POLES

S&C power fuses can be pole-mounted for line sectionalizing, fusing distribution transformers where short-circuit currents are unusually high, and protecting distribution feeders. Low energy arc-extinguishing action reduces exhaust blast hazards to tolerable limits for linemen and the public alike.

S&C power fuses

50/60 CYCLE SHORT CIRCUIT INTERRUPTING RATINGS OF S&C TYPE SM POWER FUSES

In Amperes, Rating Is RMS Asymmetrical—In Kva, Rating Is Symmetrical 3-Phase on Basis of Asymmetry Factor 1.6

Nominal Rating, Kv		SM-4 REFILL UNIT						SM-5 REFILL UNIT					
Fuse	System	SM-4D INDOOR HOLDER (with Sneezer)		SM-4B INDOOR HOLDER (with Muffler)		SM-4 OUTDOOR HOLDER (without Sneezer or Muffler)		SM-5D INDOOR HOLDER (with Sneezer)		SM-5C INDOOR HOLDER[1] (with Muffler) Caution—See Note		SM-5 OUTDOOR HOLDER (without Sneezer or Muffler) Caution—See Note	
		Kva	Amp	Kva	Amp	Kva	Amp	Kva	Amp	Kva	Amp	Kva	Amp
4.16	2.4									150 000[2]	60 000	150 000[2]	60 000
	2.4/4.16 GrY									250 000[2]	60 000	250 000[2]	60 000
7.2 (7.5)	2.4	45 000	17 500	72 000	27 500	72 000	27 500	90 000	34 500	.....	44 500	.....	44 500
	2.4/4.16 GrY	80 000	17 500	125 000	27 500	125 000	27 500	150 000	33 500	200 000	44 500	200 000	44 500
	4.8	90 000	17 500	144 000	27 500	144 000	27 500	156 000	30 000	225 000	43 500	225 000	43 500
	7.2	115 000	15 000	195 000	25 000	195 000	25 000	195 000	25 000	325 000	41 500	325 000	41 500
14.4 (15)	7.2	115 000	15 000	195 000	25 000	195 000	25 000	195 000	25 000	300 000[2]	40 000	300 000[2]	40 000
	4.8/8.32 GrY	135 000	15 000	225 000	25 000	225 000	25 000	225 000	25 000	350 000[2]	40 000	350 000[2]	40 000
	12	195 000	15 000	260 000	20 000	260 000	20 000	300 000	23 000	500 000[2]	40 000	500 000[2]	40 000
	7.2/12.47 GrY	200 000	15 000	270 000	20 000	270 000	20 000	310 000	23 000	500 000[2]	40 000	500 000[2]	40 000
	7.62/13.2 GrY	200 000	14 000	285 000	20 000	285 000	20 000	325 000	22 500	500 000[2]	40 000	500 000[2]	40 000
	13.8	210 000	14 000	300 000	20 000	300 000	20 000	340 000	22 500	500 000[2]	40 000	500 000[2]	40 000
	14.4	220 000	14 000	310 000	20 000	310 000	20 000	350 000	22 500	500 000[2]	40 000	500 000[2]	40 000
23	7.2/12.47 GrY	.....	12 500	.....	20 000	.....	20 000	.....	20 000	.....	32 000	.....	32 000
	14.4	.....	12 500	.....	20 000	.....	20 000	.....	20 000	.....	32 000	.....	32 000
	23	250 000	10 000	375 000	15 000	375 000	15 000	435 000	17 500	750 000	32 000	750 000	32 000
34.5	23	.....	10 000	.....	15 000	.....	15 000	.....	17 500	.....	28 000	.....	28 000
	27.6	.....	8 800	.....	12 500	.....	12 500	.....	16 300	.....	28 000	.....	28 000
	34.5	280 000	7 500	375 000	10 000	375 000	10 000	560 000	15 000	1000 000	28 000	1000 000	28 000

1. Available only when furnished as an integral component of metal-clad switchgear, constructed in accordance with Data Sheet 605-1 and 605-2.

2. Nominal rating.

OUR GOLDEN JUBILEE

For additional information on S&C power fuses, contact your local S&C representative or write to:

S&C ELECTRIC COMPANY

4435 Ravenswood Ave. • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911

Electrical World

DECEMBER 25, 1961
Vol. 156, No. 26

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NEXT WEEK NEW 500-KV TEST LINE of TVA completed and engineering data given.

The Electrical Week

LATE NEWS ▸ **Further remarks are made on Interior Department report recommending ±375-kv dc** for BPA-California intertie (see p 34). In Washington, Interior Secretary Stewart Udall tells press conference Administration wants more money in fiscal 1963 to complete detailed studies of the proposed line, and may seek construction funds in fiscal 1964. Earliest possible line completion date, he notes, would be 1966. Udall says line isn't part of a "national grid," but he implies that new task forces will be appointed to study other interties. He asserts BPA-California project would be "self-liquidating" and that the "tangible dollar benefits to the combined regions each year would be at least double the annual cost" of the project.

A Pacific Gas & Electric spokesman says, "There is no need whatever for the federal government to spend vast sums of public money to build the EHV transmission lines proposed in the report. Last week we announced that plans are well advanced for a third interconnection with Pacific Power & Light (also see p 34). We are constantly studying the reinforcement and expansion of our interconnections and improvements in power pooling with other utilities and we expect to carry them out as the need arises and they can be justified economically."

In Portland, BPA Administrator Charles Luce (one of the task force members), says the dc tie would improve BPA's financial condition by $6 million a year and two such lines should up BPA's net by $15 million a year.

AEC staff recommends provisional construction permit for Peach Bottom, Philadelphia Electric Co's 40 Mw gas-cooled graphite reactor.

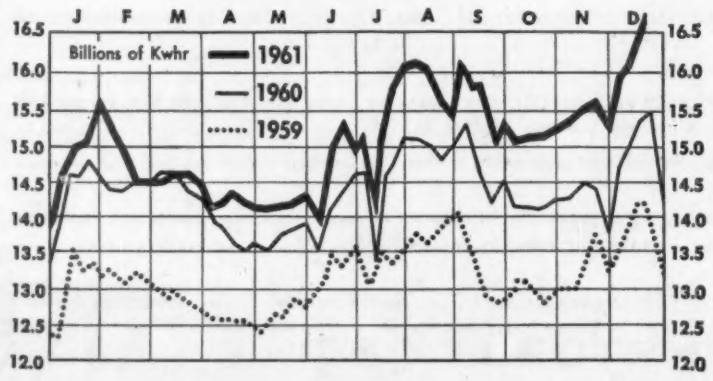
First holder of the Philip Sporn Chair in Electric Power Systems Engineering at Rensselaer Polytech will be Dr. E. T. B. Gross. Chair sponsors are American Electric Power, Atlantic City Electric, Central Hudson G&E, Hartford Electric, three manufacturers, three contractors, and six coal companies.

Southwestern Power Administration is studying interconnections at 345 to 800 kv with systems of TVA, Southeastern Power Administration, and USBR Missouri River Basin. SPA administrator Wright says ownership of proposed lines "should be vested in those utilities that will have the most use of that section of line."

GE dedicates new $3½ million Materials and Process Laboratory in Schenectady where research and development will be done on materials for steam turbine-generators. Company also ships 100 millionth kw built since first unit in 1903. Latest unit is 363-Mw turbine-generator for Con Edison.

US electric power output reaches all-time high. See chart below.

WEEKLY POWER OUTPUT—Up 8.1% (Week ending Dec. 16), Kwhr 16,695,000,000



Percent Change From Previous Year

	Dec. 2	Dec. 9	Dec. 16
Total U. S.	+ 8.0	+ 7.1	+ 8.1
New Eng.	+ 9.1	+ 8.7	+ 8.4
Mid. Atlan.	+ 9.7	+ 9.2	+10.1
Cent. Indust.	+ 8.0	+ 7.3	+ 7.8
West Cent.	+ 6.9	+ 7.9	+10.5
Southeast	+ 5.2	+ 4.6	+ 2.5
South Cent.	+10.2	+10.1	+11.8
Rocky Mount.	+ 9.4	+10.8	+12.1
Pacific			
NW	+ 5.7	+ 1.4	+ 8.5
SW	+12.1	+ 8.4	+13.7

Seasonally Adjusted Index 307

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Source: Edison Electric Institute

Supply Lines

PRICES GOING UP? SOME SAY YES, OTHERS SAY NO

Electrical equipment market beginning to firm up? There's disagreement among utility buyers and within certain utilities, but a few managements feel strongly enough to order advance buying in some lines. That means they are willing to tie up money, incur taxes in some states, and pay interest on investment in materials and equipment as a hedge against expected higher prices six months or so from now. They'll know whether the risk paid off before the end of '62.

Thinking behind the advanced buying runs something like this: The general economy has been pushing to prosperity levels during the last half of this year. The recession is licked for business generally. Volume has been reported good in all lines of transmission equipment during much of this year, and satisfactory on distribution equipment. Backlogs on generation equipment are impressive. There is the feeling by some that equipment prices must be near bottom with no way to go but up.

But there is another side to the coin. There is no guarantee that the electrical equipment manufacturers must share in the general industrial prosperity. It's true that the psychological blow dealt by the antitrust indictments is wearing off, but the damage litigation is just getting underway. These damage suits aren't likely to give the market a psychological boost, and could prolong the initial effects of the indictments.

The big question is how much productive capacity will influence the marketplace, and what are the facts on productive capacity. Generally it is thought there is unused capacity which could be the real price depressant during the next year. This figures heavily with those who look for prices to stay at their current levels.

Also to be taken into consideration are the manufacturers reactions to year-end statements. Low-profit or no-profit margins will force some decisions. They could put some backbone into pricing decisions or they could bring about a diversion of production facilities to other lines.

CON ED ASKS FOR BIDS ON 345-KV CABLE

Firm bids for some 17 miles of 345-kv ac cable have been asked by Consolidated Edison Co from the four cable manufacturers that are participating in field tests at the Cornell EHV Cable Testing Stations. They are Phelps-Dodge, General Cable, Okonite, and Anaconda Wire & Cable. This bid call represents a "first" for 345-kv cable in the US. Con Edison will install it between Dunwoodie substation in Westchester County and one of the company's generating plants on Manhattan Island. Capacity of the cable is not known, but the cable conductor is to be 2,000,000 cir mill. It is understood that bids will be submitted early next year.

COAL INDUSTRY GROUP TABULATES PRICE DECLINE IN EAST

Price of coal along the East Coast has declined 7.8% since 1958 according to figures released by the National Coal Policy Conference, Inc. Coal used by electric utility plants in the 17-state area stretching from Maine to Florida, cost $33

million less in 1960 than it would have at 1958 prices, the report stated. As part of its battle against residual oil the Conference pointed out that, ". . . declining coal prices have been a major factor in the ability of electric utility companies to stabilize electric rates to residential customers," Conference President J. E. Moody said that the most "significant aspect" of reduced coal prices is to "stabilize the entire fuel market," forcing other fuel industries to "hold the line" on both domestic and imported fuels. Table shows total utility coal purchases in East Coast states, and price comparisons for 1958 and 1960:

State	Coal Consumed 1960 (Thousand Tons)	Prices 1958 ($ Per Ton)	Prices 1960 ($ Per Ton)	Savings ($ Per Ton)
Connecticut	2,785	10.42	9.71	.71
Massachusetts	2,443	10.40	9.55	.85
New Hampshire	98	11.05	11.07	(.02)
Rhode Island	573	11.95	10.18	1.77
Vermont	18	11.22	10.97	.25
New Jersey	3,413	9.56	9.37	.19
New York	9,771	9.95	9.29	.66
Pennsylvania	8,628	6.48	6.19	.29
Delaware	674	9.33	8.59	.74
District of Columbia	446	9.93	9.42	.51
Florida	1,105	8.45	7.41	1.04
Georgia	2,601	7.38	7.35	.03
Maryland	3,073	9.53	8.45	1.08
North Carolina	5,636	8.05	7.23	.82
South Carolina	1,518	8.44	7.44	1.00
Virginia	6,018	8.32	7.08	1.24

NOTE: New Hampshire figures a low price increase

TWO MORE UTILITIES FILE DAMAGE SUIT

Public Service Co of Colorado and Tucson Gas, Electric Light & Power Co have jointly filed a triple damage suit, naming three manufacturers as defendants. The product involved is turbine-generators and the manufacturers are General Electric Co, Westinghouse Electric Corp and Allis-Chalmers Manufacturing Co.

Triple damages are sought but the amount of alleged damages is not specified. Public Service says from June 1, 1948 to July 1, 1960, it bought eight turbine-generator units costing a total of $18,255,640 from the three companies. For the same period, Tucson says it purchased seven units costing $10,759,216. Public Service President Robert T. Person says a number of other damage suits will be filed before Feb. 6, 1962 by the two utilities.

Line Material's All-New Round-Wound® B-B Transformers With Duralem™ Insulation

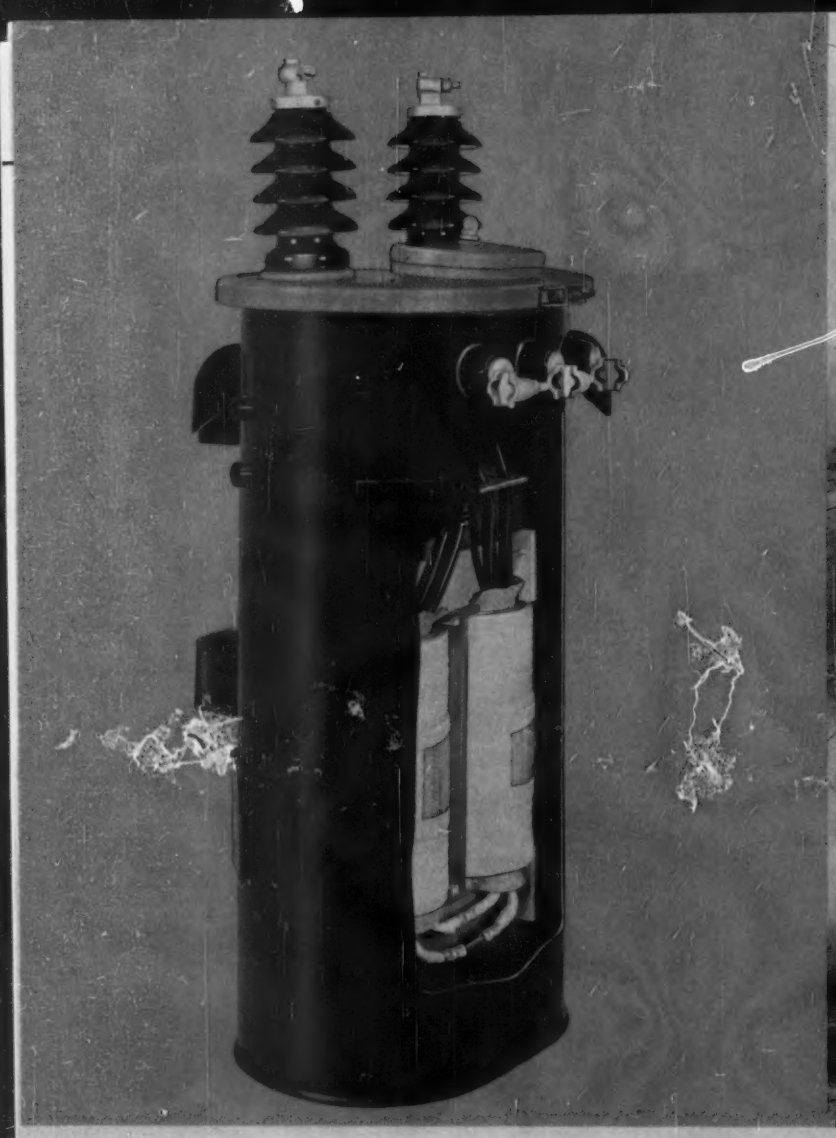
A Better Buy

To Purchase
To Install
To Operate

LINE MATERIAL® Industries
McGRAW-EDISON COMPANY

Transformers

McGRAW EDISON



NEW L-M ROUND-WOUND B-B Transformer is a better buy to purchase, because it has new Duralem high temperature insulation; low-temperature Round-Wound design; it is lighter and smaller; it offers many new features.

THE NEW L-M ROUND-WOUND B-B is smaller and lighter. It's easier to hoist and install, and it takes less pole space. It makes warehousing easier; re-

L-M Round-Wound B-B Transformers–

A Better Buy To *Purchase*

L-M's design engineers have gone all out to give you an all-new transformer, not just one with improved insulation. The new Round-Wound B-B transformer offers a Better Buy in original purchase. It is better electrically and mechanically.

New Electrically

New Duralem high-temperature insulation has been designed into L-M's unique Round-Wound core-and-coil. Now you get the perfect combination: high-temperature insulation, and low-temperature Round-Wound design. The core-and-coil unit has been reduced in size, resulting in lower losses and impedance.

Duralem insulation permits higher operating temperatures. L-M's unique Round-Wound core-type design still affords the best transfer of internally generated heat. The new B-B transformer maintains its high overload capacity.

New Mechanically

L-M's new Round-Wound B-B transformers have been completely redesigned. New smaller tank has Levroc cover with two-piece band. Hand-hole covers are held by a single bolt. All bushings are internally clamped. HV connectors have larger opening to accommodate both copper and aluminum conductors.

L-M Round-Wound B-B

A Better Buy To

L-M's new Round-Wound B-B transformers are smaller and lighter. They require less room to store, less effort to handle. L-M's new B-B transformers are shipped on pallets and can be warehoused with the most modern material-handling techniques.

Hand-hole cover is easy to remove if tap

LM® LINE

545

Transformers

quires less effort to handle. One-bolt hand-hole cover simplifies tapchanging; new high-voltage bushing connectors are easier to wire up.

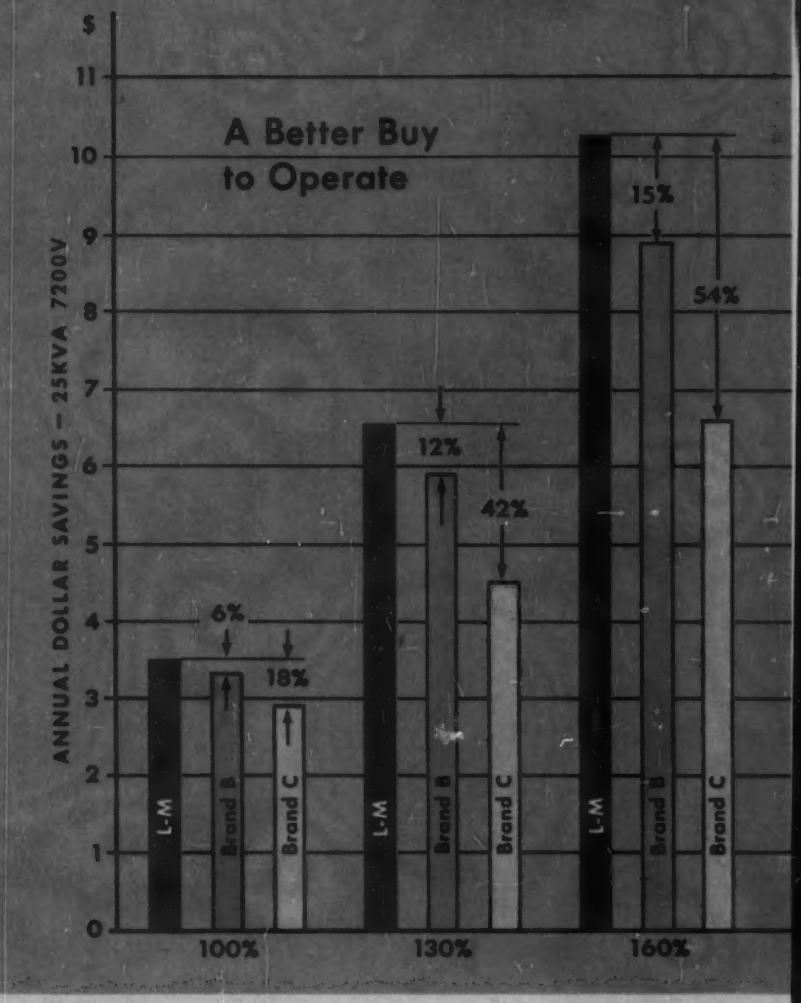


CHART SHOWS ANNUAL SAVINGS of new L-M Round-Wound B-B Transformer over L-M's previous transformer and the new models of two other leading brands. Note that L-M's B-B saves 6% more than the next best transformer at 100% load, and 15% at 160% load. The new Round-Wound B-B is the most economical to operate.

Transformers– *Install*

adjustment is required. Large openings in new high-voltage terminal make it easy to insert larger size aluminum or copper conductor.

L-M's new Round-Wound B-B transformers with obround tanks are smaller and lighter. They are easier to hoist. They exert less stress on poles, and use less pole space.

MATERIAL®
Industries
McGRAW-EDISON COMPANY

L-M Round-Wound B-B Transformers– A Better Buy To Operate

L-M's new Round-Wound B-B transformers with Duralem insulation basically produce a smaller core-and-coil assembly. Losses are greatly reduced. Lower losses mean less wasted power at the transformer.

L-M's new B-B transformer has the unique Round-Wound design, which provides the best cooling system known to transformer manufacturers. Coils have cooling oil about their entire periphery. More coil surface is exposed to oil. Internal heat is carried away faster. L-M's new B-B transformers remain cooler under overloads.

Lower losses and the better cooling typical of the Round-Wound design offer a better opportunity to accommodate increased load growth.

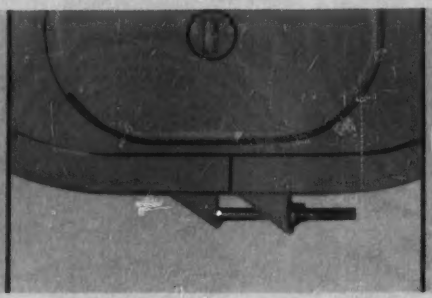
Impedance of L-M's new Round-Wound B-B transformers is now much lower. Regulation at all loads is greatly improved. You'll have fewer changeouts due to low utilization voltage.

This advertisement is printed on ordinary kraft paper. If you would like to see an actual sample of Duralem insulation, ask the L-M Field Engineer.

L-M's New Round-Wound B-B Transformers Have These Important New Features

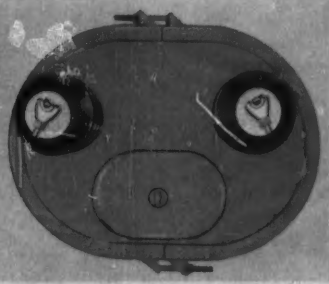
DURALEM INSULATION

Duralem insulation gives better mechanical and electrical performance at high temperatures than conventional electrical grade kraft. L-M's new B-B transformers with Duralem withstand high-current stresses better, even after heavy overloads.



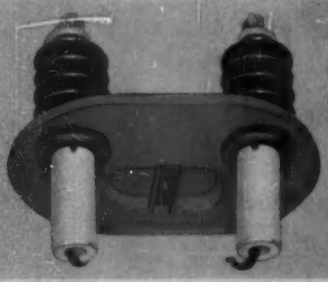
BAND COVER CLOSURE

L-M's completely redesigned Round-Wound B-B transformer covers are sealed with a two-piece band. Bolts and nuts are captive and cannot be lost. Band exerts an even pressure on tank, rim, cover and gasket, providing a complete seal.



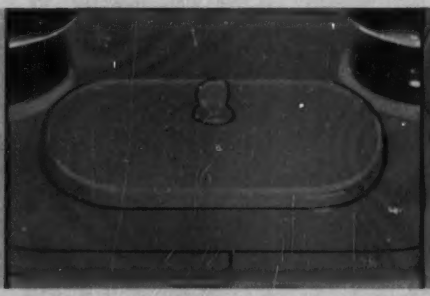
LEVROC COVERS

A fusion-bonded thermoplastic cellulosic finish is applied to all transformer covers above 5 kv. This outstanding coating provides a tough, weatherproof finish with a high dielectric strength. Outages caused by wildlife are eliminated.



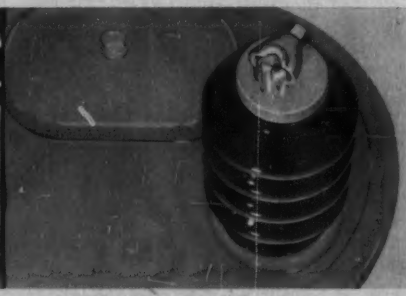
INTERNALLY CLAMPED BUSHINGS

High-voltage bushings on L-M's new B-B transformers are internally clamped. This new design bushing is better looking; it provides an oil-tight seal; it gives excellent freedom from radio noise; elimination of external clamps avoids corrosion.



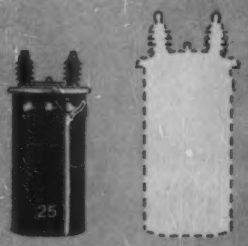
1-BOLT HAND-HOLE COVERS

Hand-hole covers on L-M's new B-B transformers are held by a single bolt. Large wings on bolt permit easy removal of cover and access for changing tap position. Even pressure between cover, rim and gasket assure complete seal.



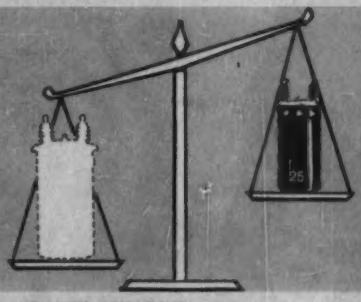
LARGE H.V. CONNECTORS

Large openings in connectors on cover bushings easily accommodate both aluminum and copper conductor. Optimum balance between area and pressure assures excellent and permanent high conductivity. Vertical take-off simplifies wiring.



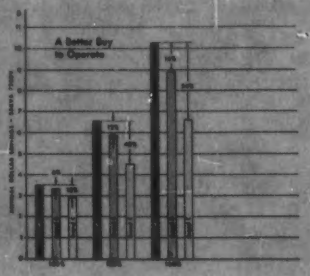
REDUCED SIZE

L-M's new Round-Wound B-B transformers have been greatly reduced in size—nearly 20% in some ratings. The 7200 volt 25 kva is only 38" high, compared to 45" for the old one. These new transformers require less room to store, less to hang.



LIGHTER WEIGHT

New Round-Wound transformers have been reduced in overall weight. This weight reduction makes handling, storage, and installation of the new B-B transformers much easier, and places less stress on any given pole.



LOWER LOSSES

Less of the power delivered to the transformer is wasted—with less heat to dissipate. In general, core loss has been slightly increased and copper loss has been greatly reduced, resulting in an average 16% overall reduction in total losses.

LINE MATERIAL® Industries

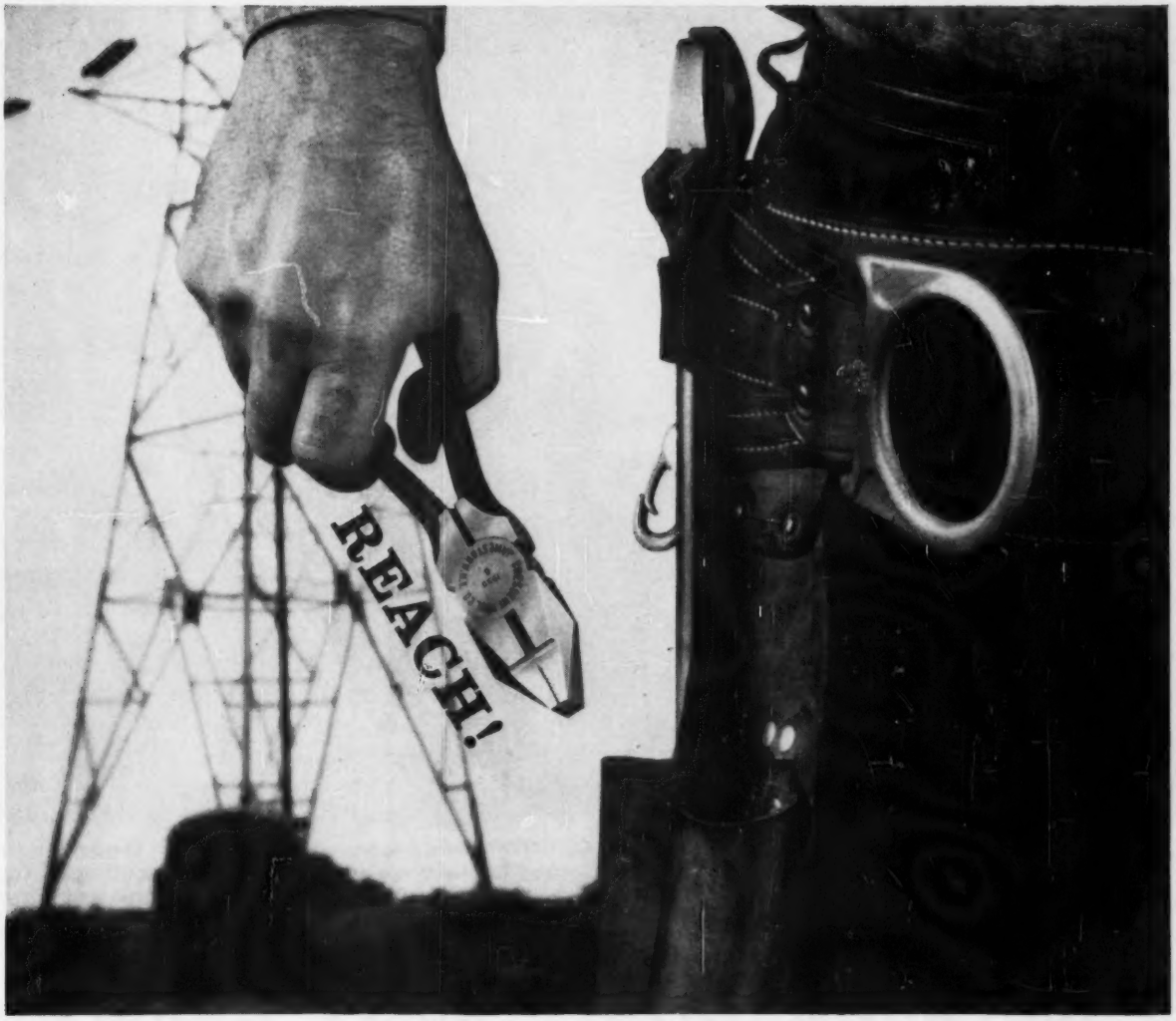
McGRAW-EDISON COMPANY

Transformers

McGRAW EDISON

545

DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT



Here is the toughest pair of pliers ever made... and the finest! These are not ordinary linemen's pliers... they are CRESCENT pliers... forged of Crestoloy steel... lightning hardened by Crescent's exclusive selective induction process... milled, ground, polished, and plated by skilled hands and precision machines... and individually tested to take far more strain than human hands can apply.

Heft a pair of Crescent pliers... they're light and they fit your hand. Put them to work... they're strong. The hand-honed edges cut clean and the sharp milled teeth grip tight... on job after job.

Tough jobs call for tough tools. The toughness we put into Crescent tools at the factory makes the job easier and safer for every man on the line.

CRESCENT
Linemen's Round Nose Plier, No. 2150. 8" long.

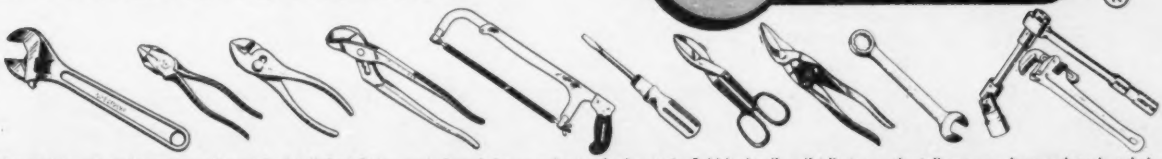
CRESCENT
Linemen's Standard Pattern Plier, No. 1950. 6", 7" and 8" long.

(Both pliers are available with blue Tenite insulated handles.)

Sold by hardware dealers and electrical distributors everywhere.

Sign of the Artisan Symbol of Excellence

CRESCENT TOOLS
Give Wings to Work ®



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

FREEZING RAIN CONDITIONS were maintained in large university's Climatometer until an ice coating averaging 3/4 inches was deposited on all horizontal surfaces of Type WAG 230 kv switch shown here in closed position. Similar tests were conducted on switches in open position.

WHEN ICE HITS... WHAT HAPPENS

When heavy icing occurs, will you still be able to open or close your air switches?

This is a question getting increasingly careful attention from engineers . . . both those who design such switches and those who apply them.

Horizontally mounted vertical break switches in the higher voltages present the greatest problem. The switch blade is long and a lot of ice can accumulate. For example a one-inch layer on the blades of a 230 kv, 3-pole switch of this type weighs approximately 132 pounds. Translate this into the extra effort required to open the switch and it comes to 2640 pound inches or 77 pounds on a 36″ swing handle. Adding further to the difficulties is the inherent design of the switch. Contacts are difficult to shield. When switch is closed, ice accumulates on the contact assembly. When open, the contact shoes become ice coated, making it necessary to chop the blade into the closed position under heavy impact.

Why do we point out such hazards to you?

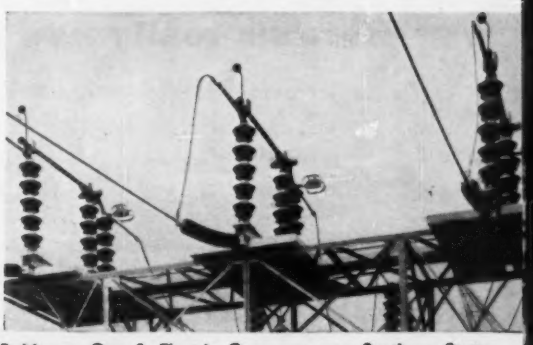
For one thing we know that our Type WAG can handle the problem. We have tested it under severe icing conditions, and it can be opened or closed by the efforts of one man.

3-POLE SWITCH IS OPENED by the efforts of one man. Heavy weight of ice required extra effort, but switches were fully opened and were in operative condition after each test.

TO YOUR AIR BREAK SWITCHES ?

The reason for the WAG's good performance under ice is simple: engineering and construction. The relationships of all moving parts are such that ice formations are in shear or tension. Force transmitting linkages are well-protected from ice accumulation. And all moving members are rugged enough to prevent deformation when the switch is forced open or chopped into the closed position.

Southern States Type WAG will operate effectively under ice and other adverse operating conditions. For complete details, contact your Southern States representative or write us for Bulletin 59 WAG.



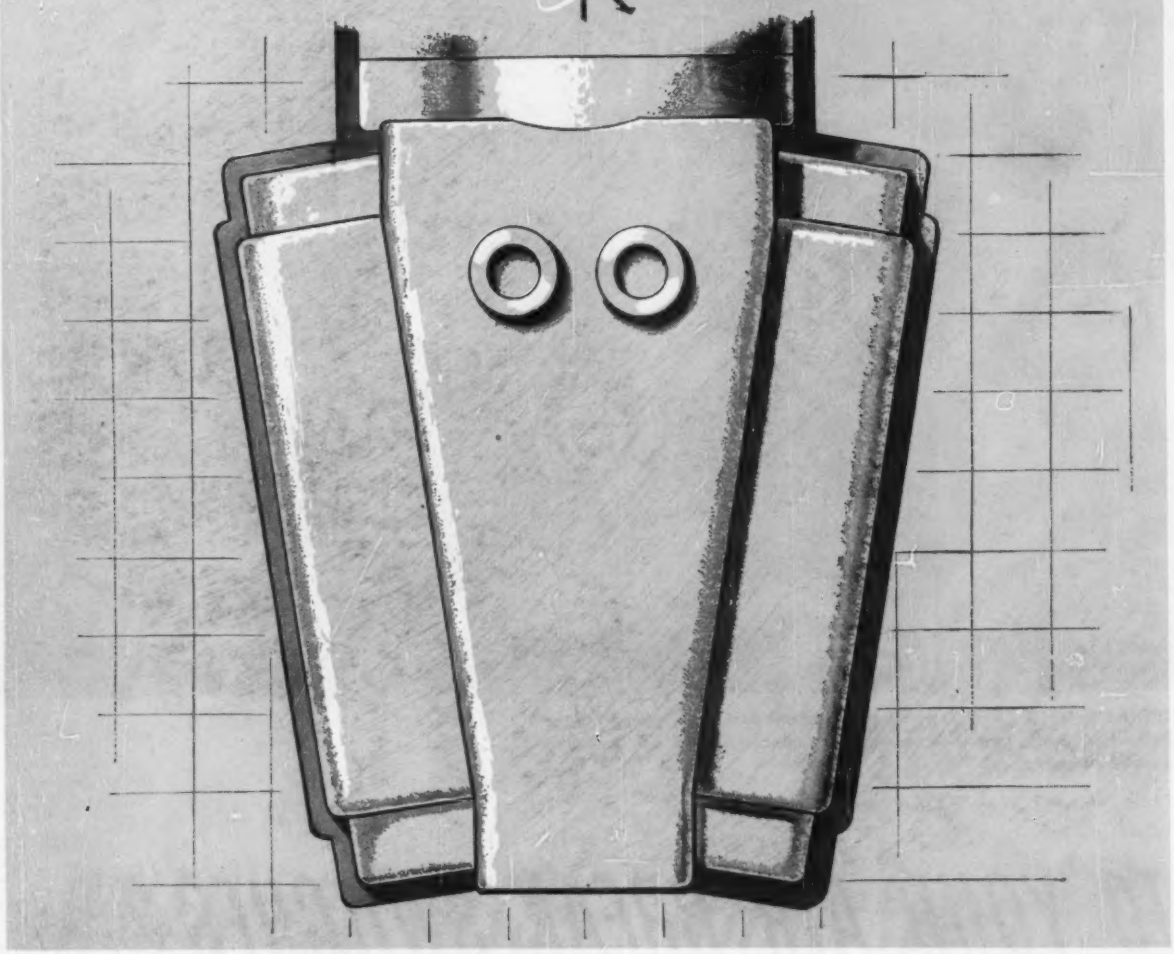
Baltimore Gas & Electric Company uses Southern States 230 kv, 1200 ampere WAG Switches as OCB disconnects on its Northwest substation, seen in the above photograph.

SOUTHERN STATES

HAMPTON, GEORGIA

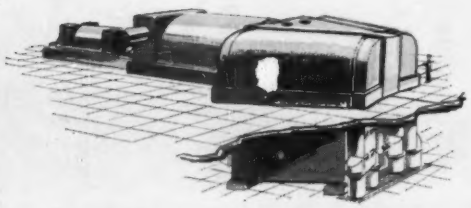
IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO

Adding new dimensions *to engineering*



Here's a really new angle in steam condenser design*

(We call it the in-line V and it could be the shape of many more to come)



*Ingersoll-Rand twin-shell in-line V condenser with 160,000 sq ft of surface for Southern California Edison Company's Etiwanda Station, Unit No. 3.

Those who have looked at this new Ingersoll-Rand condenser design say that it represents the neatest job of "tailored engineering" seen in a long time. Arranged as an in-line V, it completely complements both the performance of the axial-flow turbine it serves and the overall station planning. Physical space is minimized, cooling-water requirements are reduced and the condenser contributes to higher overall plant efficiency.

At Ingersoll-Rand we like to apply new ideas and design concepts to the *overall engineering problem.* That's why I-R condensers continually set the pace for highest performance and adaptability to *any turbine-condenser arrangement.*

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This Transducer can save more than it costs

New Westinghouse Teleductor

Here is a simple, accurate and safe transducer which transforms a-c voltage or current into d-c millivolts or milliamperes to operate recorders, controllers, telemeter transmitters and supervisory equipment. It brings you savings that can add up to more than its cost — eliminating switching of instrument transformers, and permitting use of small-gauge wires to instruments.

The Teleductor* can also be used by itself as a simple and economical telemeter transmitter where a d-c line circuit is available.

The Teleductor protects people and equipment when current transformer secondaries are accidentally open-circuited. Prevention of one accident would pay for the Teleductor many times over. Load on current transformer remains practically constant when teleductor output is open-circuited.

Accuracy — nominally within 1% over full range with wide variations in output loading and ambient temperature.

Convenience — small size, easily mounted in any position. Dimensions are 4¼″ x 3$\frac{5}{32}$″ x 3⅛″.

Linearity — output is linearly proportional to current or voltage input.

Reliability — no moving parts or vacuum tubes. Basic element is cast in epoxy resin to resist moisture, shock and vibration.

For further information on the new Teleductor, contact your Westinghouse representative or write for Catalog Section 56-526 to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

You can be sure . . . if it's Westinghouse. J-91025

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POWER PIPING

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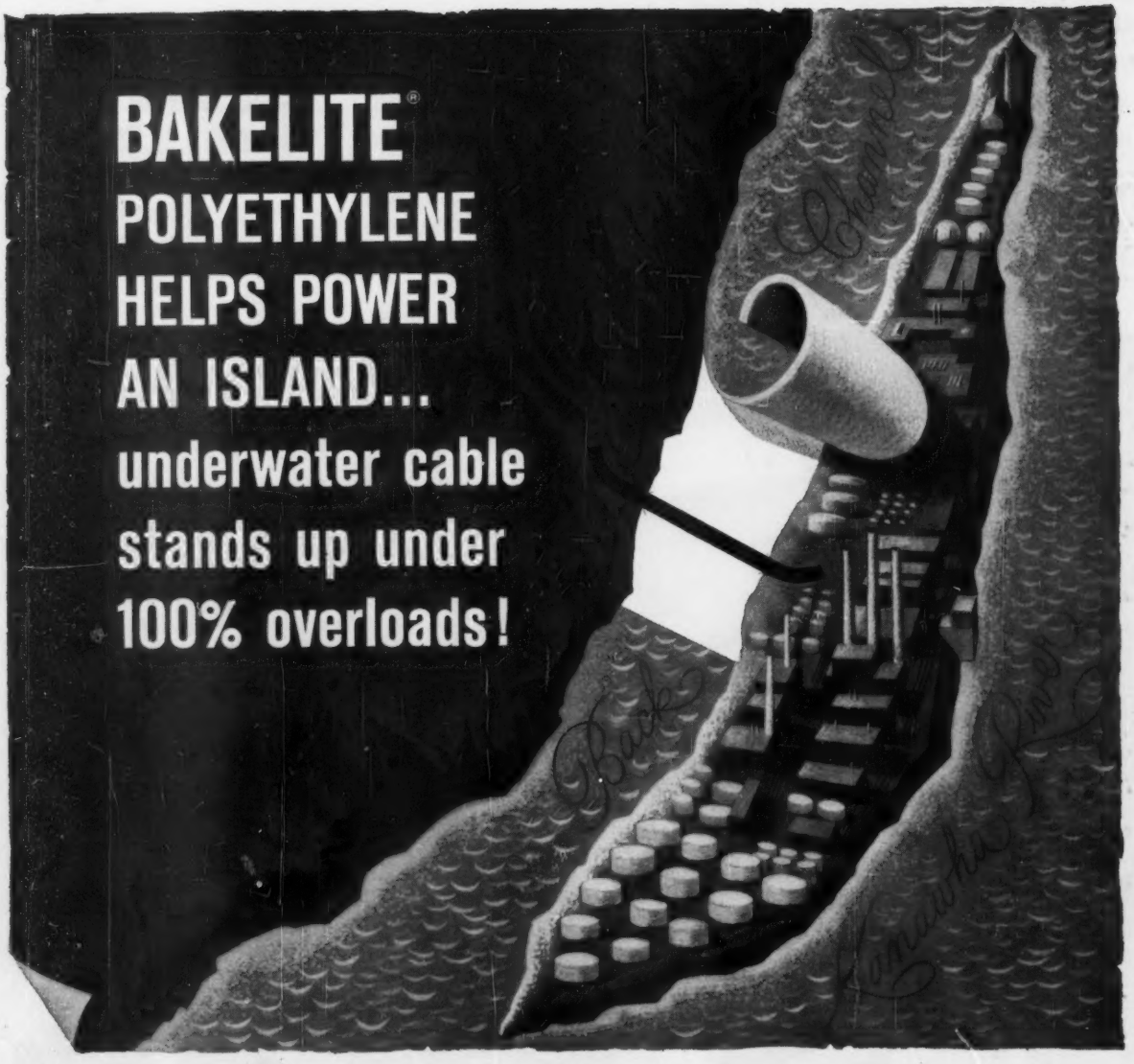
HEADQUARTERS

ELECTRICAL WORLD • *December 25, 1961*

29

BAKELITE® POLYETHYLENE HELPS POWER AN ISLAND... underwater cable stands up under 100% overloads!



Termination of power cable insulated and jacketed with BAKELITE polyethylene in a powerhouse cubicle on the mainland.

So. CHARLESTON, W. VA.: In 1956, Union Carbide Chemicals Company found an easy solution to bringing electric power from the mainland to Blaine Island. The submarine carrier: a single 15-KV load transfer cable, insulated and jacketed with durable BAKELITE polyethylene, laid along the bottom of a channel . . . without additional shielding.

Although continuously exposed to severe physical and chemical tests, the BAKELITE insulated-jacketed cable has provided failure-free 'round-the-clock power . . . despite wide load variations. Even a recorded 100% overload lasting several seconds didn't interrupt service or damage the cable.

When you have a power cable problem, it makes good sense to choose cable insulated and jacketed with BAKELITE polyethylene. Tough, durable, highly resistant to moisture and cracking, and an excellent low-loss dielectric, BAKELITE polyethylene is designed to provide optimum performance under severe conditions. Flexible and light in weight, polyethylene insulated-jacketed cables are easy to install, require no protective ducts or conduits.

Want more information? Write Union Carbide Plastics Company, Division of Union Carbide Corporation, Dept. KL-43L, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE PLASTICS

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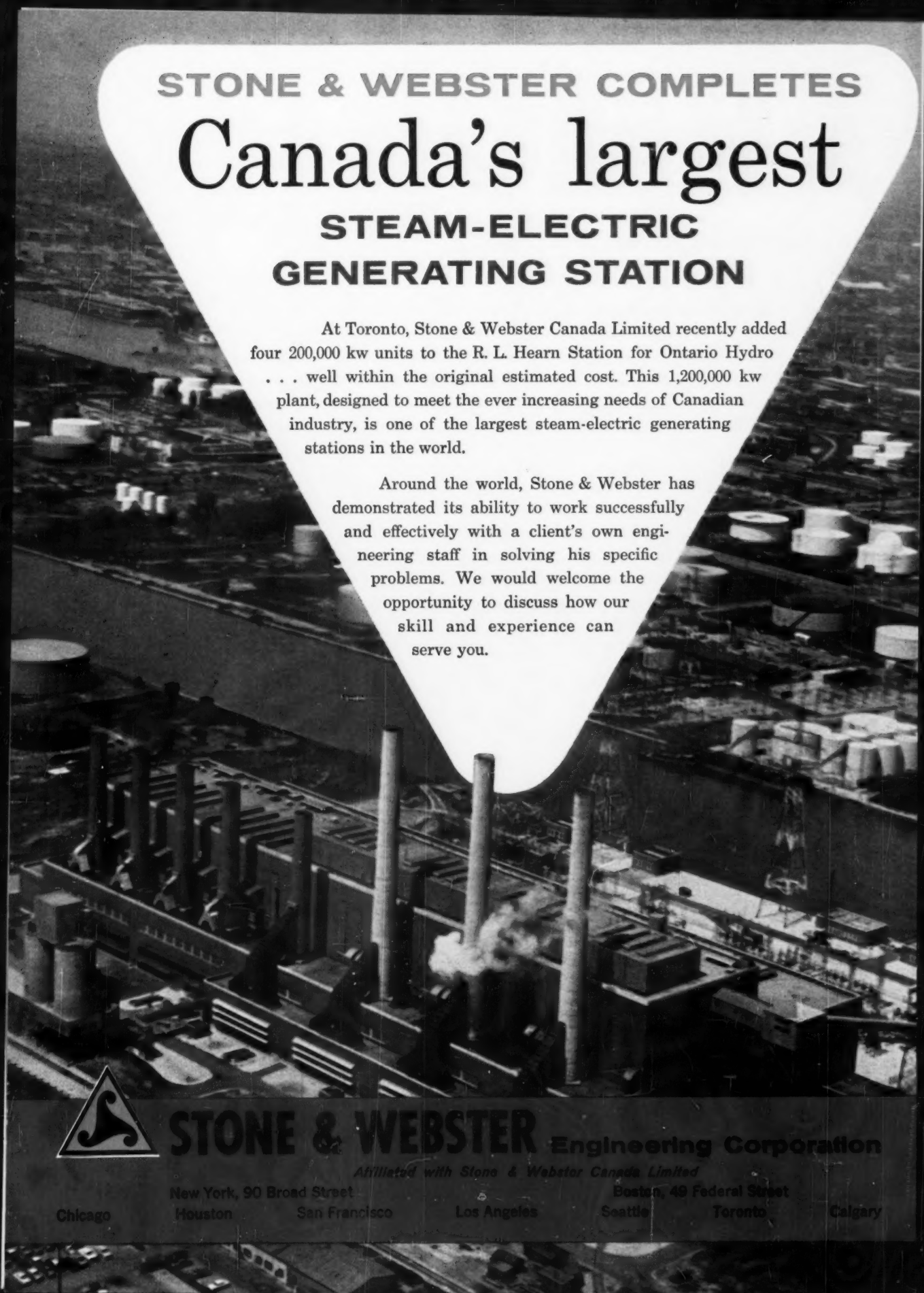
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GENERATING STATION
At Toronto, Stone & Webster Canada Limited recently added four 200,000 kw units to the R. L. Hearn Station for Ontario Hydro . . . well within the original estimated cost. This 1,200,000 kw plant, designed to meet the ever increasing needs of Canadian industry, is one of the largest steam-electric generating stations in the world.
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ARMORTEC safeguards your transformers six ways:

RESILIENT — Armortec shrugs off abrasions and hard knocks. Won't crack or craze like other coatings.

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8

Prayer at Christmas

May the approach of Christmas
be the time for a universal reawakening
to the true spirit of the season.
May our children one day
live in a world where
Peace, good will toward all men
rings loud and true,
. . . a world where all are free
to rejoice together.

(From the Christmas message of Houston Lighting & Power Co)

Task Force Backs ± 375-Kv Dc for

Proposals cover over 900 miles of lines and terminals at San Francisco and Los Angeles

The long-awaited report on the Pacific Northwest to California interconnection made its debut last week. It recommends the line be ±375 kv direct current. If built, it would be the longest and biggest dc transmission line in the world.

Transmission by ±375 kv dc is the most economic of the plans studied, the report says. Voltages of 345 and 500 kv ac were used in other plans. Eight plans, shown in Table I, were studied.

California Pool Formed

California's four principal investor-owned electric utilities have announced the completion of plans for state-wide pooling of generating resources. Pool members are Pacific Gas & Electric Co, Southern California Edison Co, California Electric Power Co, San Diego Gas & Electric Co.

The agreement provides that the pool members will **(1)** coordinate development and operation of their respective generating and transmission facilities; **(2)** share reserve capability; **(3)** provide mutual assistance in times of emergency; **(4)** sell and exchange power; **(5)** operate their respective systems so as to insure instantaneous interchange of power when necessary; **(6)** cooperate in planning and completion of schedules of new facilities; and **(7)** exchange engineering and operating data. The agreement will become effective when necessary governmental authorizations are obtained. The pool will be coordinated by a board of one representative from each member utility.

No engineering details were made available but PG&E said it and SoCalEd are contemplating strengthening the existing 220-kv tie between them in the near future. Also, PG&E said, "studies are well along on an extra high voltage (at least 500 kv) interconnection between the two systems. Plans are also well advanced for an additional interconnection with Pacific Power & Light Co which would be available to transmit surplus Northwest power into California." On its part, SoCalEd adds it plans to enlarge its present tie with SDG&E and install a tie with Calectric.

According to the *1961 McGraw-Hill Directory of Electric Utilities*, as of Jan. 1, 1961, system capabilities were: Calectric 382 Mw; PG&E 5,608 Mw; SDG&E 717 Mw; SoCalEd 4,039 Mw. Tie capacities were: Calectric-SDG&E 10 Mva; PG&E-SoCalEd 250 Mva; SoCalEd-SDG&E 60 Mva. SoCalEd also has a 200-Mva tie with Los Angeles Department of Water & Power.

The report does not go into the question of who should build and operate the interconnection, although its economic comparisons are based on Bonneville Power Administration financing costs. It suggests that "possibly ownership and financing of the intertie could be mixed—part federal, part public agency, and part private utility."

But the area preference problem, a possible stumbling block to the intertie, is turned over to the BPA which is urged to make a report soon.

Furthermore, the report finds that "it would also be economic to complete the 230-kv ac interconnection between the Bonneville Power Administration system and the Pacific Gas & Electric Pit River No 3 plant."

Specifically, the report recommends:

- Earliest construction of a ±375 kv dc, 650 to 900-Mw common-carrier interconnection between Columbia River hydro plants, San Francisco, and Los Angeles. If contract prices of dc equipment substantially exceed cost estimates, or if technological improvements or price changes in ac equipment substantially reduce its unit costs, the design of the interconnection could be 500 kv ac.
- Negotiations for the sale of power should be commenced by BPA and the Bureau of Reclamation with public and private power agencies in the State of California. Also negotiations between BPA and PG&E should be recommenced, looking to early completion of the 230-kv interconnection from Klamath Falls, Ore., and the sale of dump power to PG&E.
- If investor-owned utilities of California participate in the use of the interconnection, the initial capacity should be doubled and two ±375-kv dc lines should be built.
- The Administration should request the second session of the 87th Congress for appropriations to plan and design the interconnection. Construction funds should be requested after the Interior Department has recommended legislation to solve the area preference problem and after determining the utilities which are interested in participating in the use and financing of the interconnection.

Five-Man Task Force Made Report

The long-awaited report was made by a special task force of the US Department of the Interior on December 15, 1961. The five members of the task force are: Charles F. Luce, Milton A. Chase, Morgan D. Dubrow, Hugh P. Dugan, and Bernard Goldhammer.

Evaluation of the economic value of the interconnection is based on a 50-year service life and takes into account only the first four of the following nine uses:

- Taking advantage of seasonal load diversities between the Pacific Northwest and Southwest;
- Selling surplus hydro secondary energy from the Pacific Northwest;
- Firming Pacific Northwest hydro secondary with Southwest steam generation;
- Selling surplus hydro peaking capacity from the Northwest;
- Reducing generating reserves in each region;

BPA-California Tie

- Providing for economy energy interchanges;
- Making possible construction of larger steam units;
- Promoting national defense;
- Conserving diminishing supply of fossil fuels.

The last five "important functions" above have not been evaluated on an economic basis "but undoubtedly they would justify a substantial investment," the report says.

While including these functions would make the line more feasible, the report says nothing concerning their effect on the selection of the best plan. But the report gives neither opinions nor facts concerning the effect of these last five functions on selection of the economic plan.

Various Plans Meet Different Needs

Eight plans for the interconnection were studied. Plans IA, IB, IC, with capacities of 650 to 900 Mw, would meet the needs of public power agencies; Plans IIA, IIB, IIC, with capacities of 1,350 to 1,800 Mw would meet the needs of investor-owned California utilities as well; and Plans IIIA and IIIB, with capacities of 2,500 Mw would be required if Canada sells about 900 Mw of firm capacity to California. The A plans are dc and the B and C plans are ac alternatives. Economic comparisons are shown in Table I.

Losses on the dc plans are substantially lower than those of the ac plans. The report states that much of this is because, in each ac plan, power flows would not be confined to the intertie but would also flow over interconnecting parallel existing low voltage transmission lines. Incremental losses for the ac plans are the difference in system losses with no interchange between the Pacific Northwest and Southwest and with maximum interchange between the two regions. Part of the increased losses are on the interconnected systems and part are on the tie lines themselves.

However, for the dc plans, the report is not clear on whether the incremental dc losses are on the same

THREE DC PLANS, IA IIA, and IIIA, have one, two, and three lines respectively; capacities are 890, 1,780, and 2,660 Mw; line lengths are 881, 1,560, and 2,448 miles

Table I – Summary of Economics of Plans for Pacific Northwest – California Intertie

Plan	Lines	Tie Capacity Mw	Incremental Losses Mw	Investment Million $	Annual Cost Million $	Annual Cost $ per Kw	Annual Cost Incl. Losses $ per Kw	Annual Benefits Million $
IA	1 ± 375 kv dc	890	64	135.6	6.0	6.72	7.58	16.7
IB	1 500 kv ac	770	220	141.6	6.5	8.40	11.83	15.1
IC	2 345 kv ac	655	220	132.4	6.3	9.59	13.62	13.8
IIA	2 ± 375 kv dc	1,780	120	226.5	10.0	5.59	6.40	33.8
IIB	2 500 kv ac	1,780	320	247.7	11.2	6.30	8.46	33.8
IIC	3 345 kv ac	1,365	390	222.0	10.1	7.39	10.82	–
IIIA	3 ± 375 kv dc	2,660	184	341.6	14.9	5.61	6.44	–
IIIB	3 500 kv ac	2,400	380	386.4	17.0	7.09	8.99	–

Notes: Losses evaluated at $12 per kw. Annual costs assume BPA and Bureau of Reclamation financing costs. Annual benefits evaluated include values from diversity, surplus secondary energy, firming up secondary energy, and surplus hydro capacity. Some figures rounded.

Table II-Basis for Cost Estimates

Line Voltage	Cost Per Mile ($000) In Oregon	Cost Per Mile ($000) In Calif.
Lines		
±375 kv dc	$67	$ 77
500 kv ac	$90	$110
345 kv ac	$65	$ 80
Terminals		
345 kv ac and 500 kv ac ± 375 kv dc	From $3.85 per kw to $5.35 per kw $30 to 40 per kw	

basis as the incremental ac losses. It does imply that dc losses do not include losses on the low voltage transmission systems.

Capacity of each ac plan was determined on an ac network analyzer. It was assumed that each plan would hold together for disturbances on the transmission grid system but not necessarily for disturbances on the intertie itself. Users of the intertie would have to maintain adequate reserves against loss of the intertie lines.

Line capacity assigned to each plan is based on a fault occurring at a one-mile distance from an intertie substation on a line not associated with the interconnection. Over 260 stability cases involving different ac voltages and combinations of ties were studied.

The studies also assumed that the intertie would be fully integrated with existing transmission grids in each area and grid reinforcements made wherever required. Cost of these reinforcements were included as part of the interconnection cost. No reinforcements within the California grid were required with the dc tie line.

Cost estimates for the dc terminal facilities, Table II, were supplied by manufacturers on a completely installed basis, providing undivided responsibility for design, manufacture, installation, and operation of terminal equipment, i.e., on a turn-key basis.

The task force believes that dc transmission for this project would develop US technology. It may then provide opportunities for economies in Alaska to Pacific Northwest, Missouri Basin to the Midwest, and West Virginia to New England transmission of energy.

According to the report, major advantages of high voltage dc in long-distance transmission are:

- Capability is limited only by conductor resistance, not by distance.
- Costs are less with dc than with ac, since fewer conductors are needed to transfer power and higher power levels per conductor are possible.
- Transmission by dc permits each region to retain its local frequency control and thereby develop an independent operating system.
- DC offers a saving in right-of-way costs and an opportunity to place transmission lines underground in metropolitan areas using cable.
- DC techniques offer a method of transmitting large blocks of power over long distances at a lower voltage than ac techniques allow.

News Scope

- ***Ghana receives $133-million loan for Volta project***
- ***PUD asks for loan to build Cle Elum steam plant***
- ***Alabama Power to install fallout stations***

● **Ghana's Volta River hydroelectric and aluminum smelter project** will receive some $133 million of US financial support.

Over the objections of Sen Albert Gore (D-Tenn.), the Administration decision is that foreign policy had more to gain than lose by participating. Sen Gore, head of the Senate Foreign Relations Committee's African affairs subcommittee, said the loan is ". . . the wrong kind of aid in the wrong place."

The US, Ghana, Britain, the World Bank and two aluminum companies, Kaiser and Reynolds, are participating. The US companies are guaranteed $54 million by the US government against loss by expropriations.

The dam, known as Aksombo, is only the initial phase of potential development. It will produce 600 Mw of power. Whether Russia will be interested in a second phase, Bui Dam, now that the West is financing the first, is speculative.

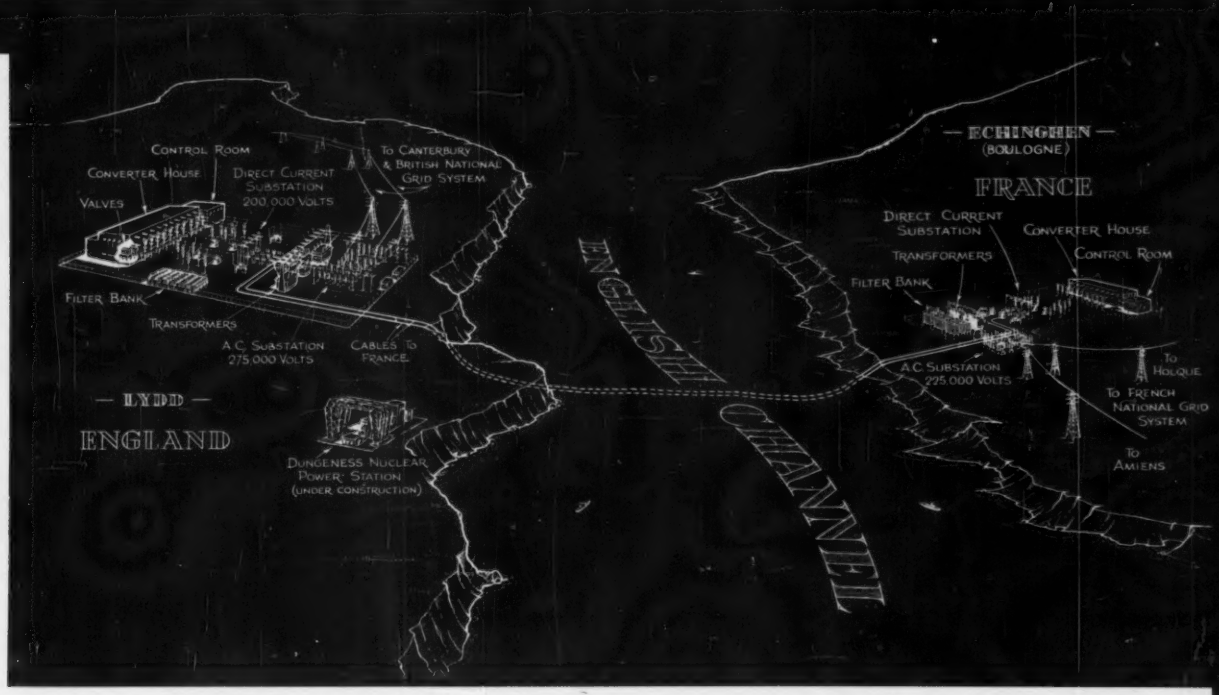
● **Application for a loan to build a 500-Mw steam electric generating station** at Cle Elum, Wash., has been made by Kittitas County PUD to the US Housing & Home Finance Agency.

S. Schultz, of H. Zinder & Associates, who made the announcement, said Bonneville Power Administration is "keenly" interested in the project and regards it as one of the foremost developments in the area.

● **Plans for establishing radiological monitoring stations** at nine generating stations are being completed by Alabama Power Co. Selected employees are being trained to operate them. When the system is established in 1962, it will be possible to determine whether plants can be safely operated in areas affected by radioactive fallout.

● **The right of rural electric cooperatives to continue to serve customers** in service areas annexed by municipalities is reaffirmed by the North Carolina Supreme Court. Citizens must choose the co-op service, however.

● **Wage increases averaging 3.76% have been given** by Tennessee Valley Authority to some 11,700 trades and labor employees.



LYDD, in Kent, England, is one terminus of the cross-English Channel dc cable system and Echinghen, near Boulogne, France, the other. Full-load power is now interchanged on schedule by the two national systems

England, France Swap Power Via DC

Systems' linkage by cross-Channel dc cable now is in operation; 'teething' troubles minor

J. H. M. SYKES, Overseas Correspondent, Engineering, Bedford, England

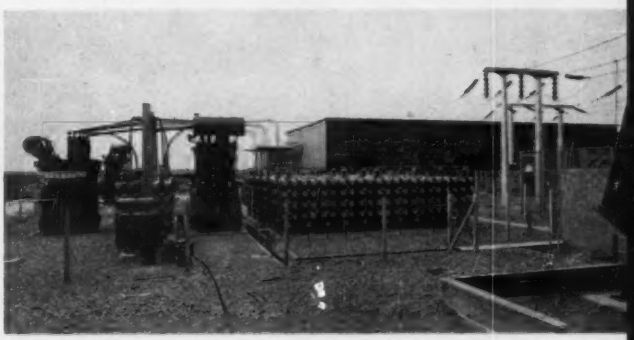
Full-load power has been interchanged reciprocally between England and France over the cross-English Channel undersea dc cable system since December 8. It continues in accordance with a program.

Power interchange began instantaneously on October 3, when the circuits were first made alive; it took place in spite of the complexity of electronic and electrical equipment involved. For the occasion, however, system operators in both countries limited the power flow in the 200-kv, 160-Mw link to 40 Mw.

The link's economic justification hinges on the peak-load time differences between England and France and on seasonal differences in plant availability in the two systems. Surplus water power in France is exchanged for British thermal power.

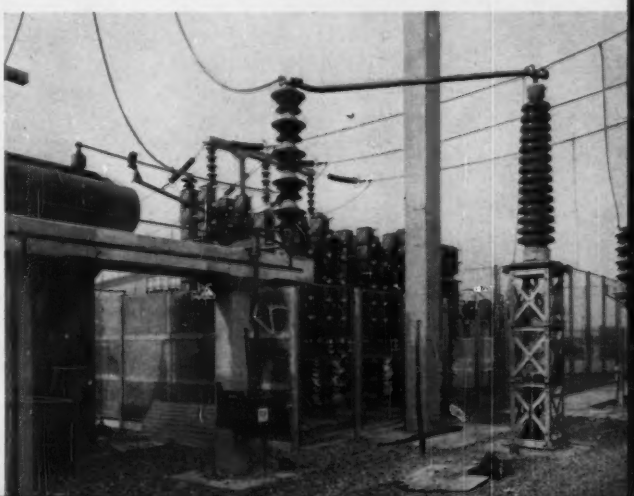
The undersea cable route is 34 miles long, the shore ends extending total route length to 40 miles. The two cables are nowhere more than 10 ft apart, a cable-laying accomplishment in the Channel's waters churned into turbulence by the powerful tidal race. Cables are as deep as 198 ft. Nevertheless, this newly commissioned submarine link is regarded as a pilot scheme, its 160-Mw capacity contrasting with those of the two linked systems, which are in the order of 27,000 Mw. There is talk already of a second, greater-capacity link.

"Teething" troubles were few. Auxiliary power was



VALVE BUILDING of Lydd Converter Station of 160-Mw, 200-kv link, with capacitor bank in the middle ground

ONE of two cable terminals in dc substation at Lydd is shown, with dc damping circuit components in background

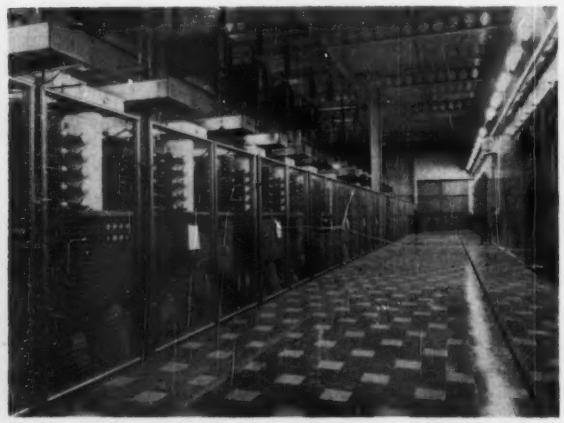


supplied to the English control gear from the supply network. Harmonics in the English system, getting through to the valve-control circuits, produced "hunting" and slight instability. Since engineers of the Swedish converter-gear contractors analyzed system waveform and found the filters to apply, stability is perfect.

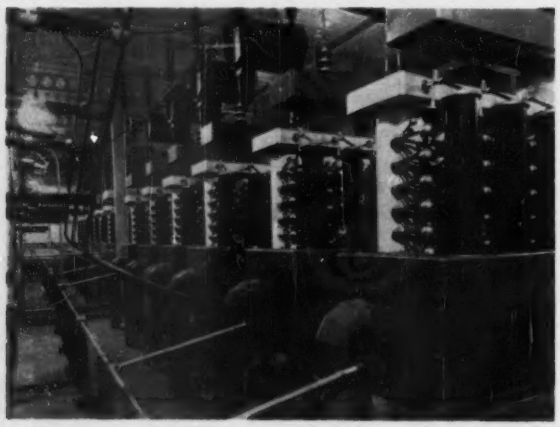
Filtering adjustments also eliminated interference with radio transmitters near the French terminus. This interference was caused by a ripple in the dc output. Screening on the buildings on both sides is such as to form complete Faraday cages. A portable radio receiver can be used without interference inside Lydd plant.

The Swedish converter-plant designers said that they would prefer not to plan a future dc installation in too great detail with regard to dc ripple voltages radiating radio and TV interference. Circuit constants and harmonic content, they said, tend to vary, and filter adjustments can be made in the completed plant from readings taken with full load flowing.

The dc cable conductors are 0.525 sq in. in cross-section and are insulated with paper for 150 kv per cm. The two terminal installations—at Echinghen, just outside the French seaport of Boulogne, and at Lydd, in Kent—are basically similar, differing only in that the French capacitor bank, two 25-Mvar assemblies, is connected directly to the 225-kv ac system. The English capacitors are connected to the tertiary winding of the main rectifier transformers.



VALVE HALL has two groups, each of six valves with an additional by-pass valve, each rated 100 kv, 800 amp



REAR VIEW of valves shown at left has high-voltage dc busbar system at left. The valve groups are in series

On each side, one of the two rectifier transformers is arranged in wye-wye and the other in wye-delta connection to give 12-phase operation on the two Graetz bridge-connected valve groups. The British transformers, said to be the largest for rectifying, are each rated 284/83.6/33 kv, 95/95/65 Mva; the French, 232/86.3 kv, 97.5 Mva.

There are six valves in each group and an additional by-pass valve to take over momentarily in the event of backfire. Each valve is about five tons and 10 ft high, 6 ft wide, and 10 ft deep. There are four anodes on each steel cathode tank, each handling 200 amp. Thus each valve can handle 800 amp. The dc output of each group is 100 kv, the two groups connected in series giving the pole-to-pole voltage of 200 kv. The system's center point is grounded through a reactor with center tap. Both ends are not grounded at the same time.

On the ac side from the valve group, these items stand:

1. Isolation transformers through which auxiliaries are supplied.

2. Isolation transformer for the control impulses to the grids of the valves, fed in from the electronic control gear.

3. A voltage divider network for measuring.

4. A damping circuit in two parts, each of three phases connected to one dc pole and then to the other by similar connections.

5. A lightning arrester connection across all three phases and going to the transformer.

On the dc side, the two poles from each valve group encounter:

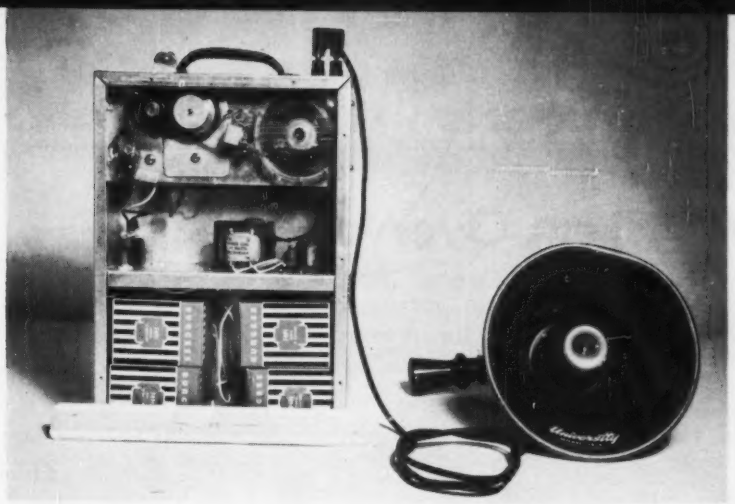
1. Voltage dividers for measuring, current transformers, and a lightning arrester with a non-linear resistance.

2. Disconnects for polarity changing with respect to the cable and a tuned dc damping circuit consisting of inductance, capacitance, and resistance in series.

3. The dc reactor and the cable connections.

System power flow is reversible. Reversal, however, normally changes the polarity of the dc cable voltages. Frequent polarity changes, almost simulating ac conditions, are undesirable. Hence, automatic disconnects change the polarity of the cable, so that under normal conditions one cable is always positive to ground and the other negative. Changing the direction of flow, therefore, is not instantaneous, but in an emergency can be made within 2 or 3 sec, regardless of change of polarity in the cable. Normally, the load is brought to zero by the control gear, the disconnects change over, and the load is built up again in the reverse direction in 2 or 3 min.

Control is based on automatic regulation to give constant power. Current varies with constant voltage. Blocking of the valves, through grid impulses, is instantaneous, so that fault current never rises above the value reached in the half cycle before effective blocking.



ELECTRIC UTILITY METHODS

E u m

OPERATIONS & TESTING

PORTABLE SOUND SYSTEM reproduces distress call of starling and chases flocks of birds from buildings and other power equipment

"Squawk Box" Startles, Chases Starlings

A "squawk box", which broadcasts a recording of a starling's distress call, is being used effectively by Tennessee Valley Authority to chase these birds away from power facilities.

When birds gather around power facilities in large numbers the cleaning job becomes expensive, insulators may become contaminated by droppings to the point of flashing over, carrier line traps may become detuned and fail to function and other problems are created.

TVA has experimented with many possible solutions to the problem and has concluded that sound, especially electronically produced sound, is the best and most practical solution.

The effectiveness of high audio frequencies was explored by using an audio oscillator. Reports indicated that frequencies in the 6- to 10-kc band would be effective. This did not prove to be the case. The only frequencies that had noticeable effect were around 1,500 to 2,600 cps. Intermittent bursts and manually warbled sounds at full power over a 50-w, high-fidelity amplifier and a 30-w, trumpet-type outdoor speaker produced mild agitation at short distances but were not satisfactory for eliminating large flocks from extensive areas.

Then, some starlings were captured and tape recordings of their distress cries were made. Analysis of the recording showed that the starling's distress call has predominant peaks at 1,350 and 4,000 cps and nothing higher than 6,600 cps.

With this information a portable squawk box was developed. The "startler" was built to broadcast the tape-recorded starling distress calls. Each unit consists of a 15-w outdoor speaker fed from an endless tape reproducer through a 10-w battery-powered, transistorized audio amplifier.

With these portable units it is possible to move starlings from the tops of river-crossing transmission line towers ½ mile away. However, for maximum effectiveness, the units are used judiciously at close range. In a relatively large area, such as TVA's Chickamauga Dam, at least three units are needed.

The birds start coming in to roost just after sunset. They congregate at the more distant points and then gradually work toward the place where they expect to spend the night.

Most effective use can be made of the "starling startler" about 20 min midway between sunset and dark. Short bursts of sound are directed toward the birds to scare them away. When large flocks in flight hear a blast of this sound they wheel and turn away.

The birds are usually most persistent the first evening they are greeted by the "startler". The second evening fewer birds appear and they are less persistent. By the third evening only a few dozen birds are expected. It is well to continue the use of the "startler" for a few evenings to discourage the last few diehards—they lead others back.

Once an area has been completely cleared of roosting starlings in this way, it will usually stay cleared for the season.

With the "starling startler", fidelity of reproducing the distress call must be maintained. The battery-powered units are adversely affected by cold weather, just when they are most needed. It is anticipated that 115-v ac powered units will solve this difficulty.

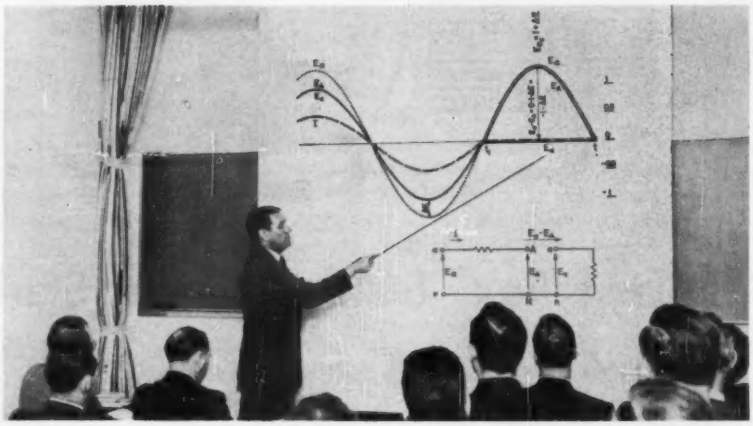
In using the "starling startler" it was found that additional loud sounds help chase the starlings from the area. TVA is experimenting with a Zon gun, which produces a shotgun-like sound by exploding measured amounts of acetylene gas. This sound, at intervals, followed by recorded starling distress cries appears to be the best combination.

The investigations also showed that when the recorded distress call of the starling was projected toward starlings, robins and English sparrows eating at a common feeding station, the starlings were frightened and left immediately. The robins and sparrows were only mildly disturbed by the sound and continued to feed. This selectivity is a disadvantage, since other annoying birds remain undisturbed. Therefore, the starling's distress call has been supplemented with other sounds.

Seminar to Cover System Overvoltages

A two-day manufacturer-utility seminar, sponsored by the Hi-Voltage Equipment Co, (Cleveland, Ohio) will be held in Cleveland, January 25 and 26, 1962. A select group of utility engineers will attend this workshop session at the company's research and development laboratory. Applications to attend may now be submitted for this seminar and others like it, which will be scheduled regularly in the future.

The staff conducting the seminar will consist of Dr. J. Zaborsky, Professor of Electrical Engineering, Washington University and consultant to Hi-Voltage; Mr. James R. Guy, General Supervising Engineer, technical section, electrical operating div of the Cleveland Electric Illuminating Co; Dr. E. T. B. Gross, Professor of Electric Power System Engineering, Graduate School and Armour College of Engineering, Illinois Institute of Technology, Chicago; and, Mr. Joseph W. Rittenhouse, Technical Director of Hi-Voltage.

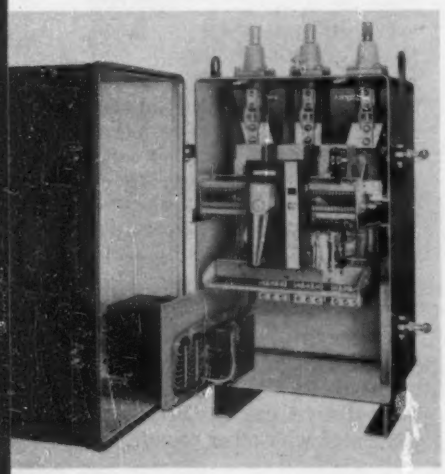


TECHNICAL DIRECTOR of Hi-Voltage Equipment Co, J. W. Rittenhouse explains a complex factor of system overvoltage to utility engineers during workshop

Subjects to be discussed; "Introduction to Recovery Voltages in the Single- and 3-Phase Cases", "Restrikes and Energizing in Resistive Circuits", "Energizing Inductive Circuits", "Restrikes in the Capacitive Circuits", "Energizing the Capacitive Circuits", "Overvoltages in Coupled Circuits" and "A Special Case of Neutral Inversion".

FPE Expands Production of Network Protectors

Federal Pacific Electric Co reports that it is now completing orders for over 100 of its new type FPN network protectors for several utility customers throughout the country. Reportedly, the outstanding features of the FPN units are their extremely sensitive tripping—down to 0.1% of the network protector rating—and a stored energy mechanism which permits remote reclosing on dead lines.



FPE's network protectors cover the range of from 800 to 3000 amp, for use with transformer banks rated from 225 to 1000 kva. Available in either submersible or ventilated enclosures, units are said to offer full range of operating features including master, phasing and desensitizing relays within single housing. The breaker of the protector is a motor-driven, spring-operated unit of quick-make, quick-break design with interrupting ratings of 30,000 to 60,000 amp.

FPE reports that it was able to establish itself as the third supplier, (the other two being Westinghouse Electric Corp and General Electric Co), of network protectors because of its long experience in producing both relays and power circuit breakers, the basic components of these units.

It is stated that the Type FPN network protectors have been designed to obtain optimum safety to operating personnel and ready accessibility of all components for inspection and maintenance.

Type FPN network protectors and their circuit breaker and relay components are being assembled in Federal Pacific's recently completed switchgear manufacturing facilities which form part of the firm's five-plant unit in Newark, N. J. Also, FPE has nine distribution and control equipment plants throughout the country.

(*More News of Manufacturers, p 55*)

Electrical World

DECEMBER 25, 1961

Management Newsletter

1961 YEAR-END REPORT

Federal Influence Felt by Utilities, Suppliers

As the year 1961 wanes, the U. S. power industry finds itself in the center of a highly complex set of circumstances, and with the federal government looking over its shoulder and exerting influence in almost every area.

As far as the utilities are concerned, having lived through two years of slightly less-than-normal growth laid to recession and gentle weather, they are prepared to resume their normal upward thrust and perhaps make up somewhat for the past two years. Heartened by general business predictions of solid growth immediately ahead, they're planning to loosen their purse-strings on capital expansion, especially in transmission.

More important yet, their view of the long-range future reinforces their belief that the industry long-term doubling period of each decade will continue uninter-

rupted as far as the forecasting eye can see. And this eye now ranges out 20 years and even further, aided by modern data gathering and analysis techniques and by that new stand-by, the computer.

This almost-sure-thing-growth, though, doesn't guarantee a utility industry equipped to maintain its long record of gradually diminishing kwhr costs at the world's best service and reliability standards.

What else is needed? As never before, the utilities are acutely aware that the health and vigor to meet these demands are predicted on certain vital assumptions. Of these, such prerequisites as availability of expansion capital, reasonable regulatory climate, and adequate supplies of reasonably-priced fuel, would seem relatively sure. But are they?

Even these, in turn, are dependent on two very basic requirements. And the events of the past year have cast shadows over both. What are these necessities?

- **The continued availability of sufficient numbers of healthy, growing suppliers** who can furnish the vital, proliferate flow of new and improved apparatus and material at prices commensurate with value
- **Ability of investor-owned and non-investor-owned utilities to cooperate** while trying to maintain identity and control, in the face of a strong push by the federal government to intervene more and more in the power business

Much of this growing intervention by Washington might be termed benevolent, at least by some of the non-investor-owned utilities. But the bulk of it is much more aggressive. It has taken the form of a sharply increased drive to insure more federal generation and transmission facilities, especially the latter. The implications for the investor utilities are not hard to see.

Insofar as the utility equipment suppliers are concerned, the shadow cast also originates in Washington, or at least from events originating at a federal level. Aggressive prosecution of the Sherman Act against the major suppliers, coupled with a transitory condition of overcapacity, has resulted in a chaotic, unstable marketplace just starting to show signs of ability to regain balance.

Even more portentous, the intent of government to continue to prosecute the Act in vaguely-defined unprecedented terms has darkened the whole scene. And impending is an intricate and expensive volume of damage suits which the utilities feel compelled to mount against their suppliers to protect their good name and financial and legal responsibilities to stockholders and ratepayers.

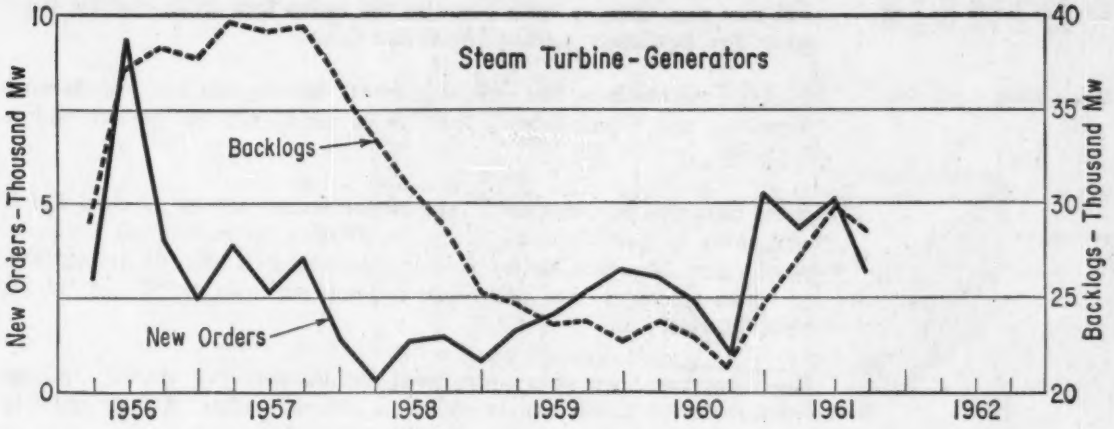
Meanwhile, back in Washington, planners promise more tampering with general business. Their activities this year ranged widely from confusing tax-reform schemes to pump-priming already proved wasteful and unnecessary.

And the utility industry, it is plain, already has been singled out for special and often unfavorable treatment in almost every area it has been touched.

One possible, unfortunate result is that Washington, knowingly or otherwise, has begun to drive a wedge of distrust between the utilities and their suppliers. It is apparent that this wedge must be blunted and removed before it causes severe, long-lasting trouble not capable of correction without further government intervention on a scale—and by methods—repugnant to the American system.

The year's events casting these shadows of uncertainty seem so important to *Electrical World's* editors that they've cast their annual Year-End Report around them. In some cases, the events themselves come through as sharp and precise. In others, they are relatively indeterminate, hidden as small and vague points along more easily seen trend lines.

We hope this review of the year's record in these vital areas will help put the 12 months in perspective. And we invite special notice to the disquieting presence of the federal government at almost every point.



The Stage Setter: The Business View

Utilities will probably remember 1961 as a disappointing year. It's not that it was a bad year, nor did it in any way alter the long range opportunities of the industry. But it did push sales down below the normal growth curve.

The weight of the 1960-61 recession fell on industrial sales. The Federal Reserve Board Index tells the story. Through the last half of '60 it dropped steadily from a July level of 109.5 (1957=100) until it bottomed out in February at a shade over 102. Basic industries vital to the utilities' industrial load were hard hit. Steel had a miserable first quarter and aluminum manufacturers cut their use of power by more than 10%. Automobiles failed to sell up to expectations, and producers durable equipment was slow. With all these factors working against them, the utilities watched industrial sales dip below the 1960 level.

The residential market was bucking handicaps as well. Appliance sales fell off sharply in the first half, and housing starts couldn't seem to get moving until late in the Spring. Added on to this was a rather mild summer which curtailed air conditioning loads. But still residential and commercial sales held strong enough to offset the losses in the industrial sales.

The economy began to move late in the second quarter, and by mid-summer, industrial production had recovered its losses. Industrial kwhr sales moved ahead of the 1960 level, and sent total sales to a new high, about 5% ahead of last year.

Having done this well despite the recession, utilities can well be optimistic for the year to come. The FRB index, which during 1961 bounced back from 102 to the current level of about 115, may average 120 for 1962. Steel is expected to turn out better than 110 million ingot tons, and business spending for new plant and equipment may be up more than 10%.

Residential sales should benefit from the stepped-up level of housing starts. In October, new units were going up at the seasonally adjusted rate of 1.44 million, against October '60's rate of 1.24 million. Appliances are expecting a gain of from 3 to 5% in sales. Commercial sales will keep right on climbing, as well.

Electrical Industry Forecast. **Sept 18, p 105**
Management Newsletters. **Third week of every month**

Looking past 1962, and further into the future, the opportunities awaiting the industry are staggering. Utilities have been making sales forecasts for the next twenty years based on population growth, and the developments in housing

57th Annual Statistical Report. Part 1, Jan 23, p 57 Part 2, Feb 27, p 73

and industry necessary to satisfy 1980's 260 million people. They estimate it will take four times as much power as the nation uses today, and the power companies are already building toward that figure.

Supply Lines. Every issue

Electrical manufacturers had a rather poor '61. But this tells only half the story. Shipments, new orders, backlogs, and prices varied with the product, and so did profits.

Heavy apparatus shipments weren't spectacular—mainly reflecting cyclical dips of new orders in earlier periods. Deliveries of about 59 million kva for power transformers, 11 million kw for steam turbine-generators and 101 million lb/hr for steam generators were well below shipment peaks set in '57 and '58 but higher than last year.

Heavy apparatus new orders were good but unsteady (see chart). Backlogs reflected the interaction between shipments and new orders. At year end they stood at the best level in years for most lines.

Most price levels through the year were either weak or weaker. But it's generally felt that, for heavy apparatus, spotty firming accounted for the drastic order swings—or vice versa. This seems to be confirmed by the rather long-range delivery dates tied to much of the new backlog.

Profit margins in '61 are difficult to define. Latest government reports show after-tax profit per sales dollar edged up in the second quarter to slightly above 3.1%. But it was still way below that for all manufacturing which rose sharply to nearly 5%. Clearly, electrical suppliers weren't piling up the profits.

Fierce competition obviously persisted during 1961—just as in '60 and even earlier. Basically, overcapacity that mushroomed in the late fifties was responsible. But other factors helped the price dive. A trough in the new orders cycle made unbearable by foreign competition in late '58 and '59 kicked it off. And the final blow came when buyers lost confidence in prices as a result of anti-trust indictments of suppliers.

Manufacturers eagerly sought solutions over the year. Most trimmed expense to bone. Some stayed out of the utility market entirely. All attempted vainly to reinstill confidence in listed prices by frequent price adjustments to reflect current competitive levels. Many introduced new or improved products offering the buyer more value at the same price or simply a lower price that still yielded a profit for the manufacturer.

Manufacturers may, however, find next year more rewarding. Certainly rising volume, heavier backlogs and the spotty price firming are hopeful signs. And with business in general on the way up and utility capital expenditures on the rise, '62 may well be the year to turn the tide.

Regardless of '62 performance, the end logically must come. Utility loads and equipment requirements are destined to grow too fast to avoid it, providing that manufacturing capacity holds reasonable levels. For instance, by 1965 utility capital spending is expected to jump 38% over the 1961 level.

At some point, capacity will have to expand. By 1980, physical size of utilities will have doubled at least twice. Total spending will be more than three and a half times the current level. Obviously, the opportunity is coming for suppliers to share in this growth.

The largest single factor which has teamed with basic overcapacity to set the present market tone is, of course, the antitrust actions and their aftermath. And 1961 certainly was a year of news in this area.

Antitrust Cases Hit Suppliers

Sentencing. Feb. 13, pp. 16, 48

February 6 and 7, 1961, are dates that will not be soon forgotten by the electrical industry. For it was on those days that 29 electrical equipment manufacturing companies and 48 of their executives were sentenced in Philadelphia for violating the Sherman Antitrust Act. And it was then that the electric utilities, the customers who had allegedly suffered as a result of the price-fixing conspiracies, were committed to a course that would lead them to seek restitution.

Much of significance concerning the cases had occurred before, and much more has happened since. But on those two days, primarily because seven executives received jail sentences, national attention was focused on the industry. The electrical manufacturing industry was no longer just one of many that had been convicted of breaking the antitrust laws. It was now a *cause celebre.*

Four-manufacturer plan. Dec. 26, 1960 p 17

The sentencing had been preceded late in 1960 by a compromise between the indicted manufacturers and the government which settled the 20 criminal indictments without court trials. Subsequently, four companies entered into a joint agreement, still in effect, whereby damages would be shared in proportion to each one's sales to the damaged customer of the product involved. A corollary to this agreement was that the companies would institute voluntary studies with customers to determine whether there had been overcharging, and, if so, to make restitution out of court.

But then the sentencing occurred. At least partly because of the publicity, utilities felt they had no choice but to sue the manufacturers, prodded by four varying factors: (1) state regulatory commissions would expect them to pursue the matter diligently, (2) so would their stockholders; (3) the possibility that damages were, in fact, due them; and (4) the vague feeling that an aroused public might mistakenly associate them as partners in the conspiracy, with possibly disastrous consequences.

Subsequently, this latter fear subsided. Perhaps it was just a hold-over worry from memories of public reaction to the holding company abuses of decades before. But the other three factors are still in effect.

Digging out facts. Feb. 27, p 15

Price and Value. June 5, p 83; June 12, p 75

Following sentencing, parties on both sides of the fence began to dig into transaction records to see what basis there was for damages. The four-manufacturer group made a price and value study and publicized it to their customers. While this study showed that prices of equipment involved generally were not out of line with cost factors and other industrial prices, there are some in the utilities

who think this study, because it is so broad and general, is really beside the point. If nothing else, however, it presented a good opportunity for the suppliers to tell a story of achievement which may have been forgotten—forgotten precisely because continuous high performance is often taken for granted.

Utilities Form Group. **March 20, p 25**

Other manufacturers also did studies on their own, as did utilities preparing for damage suits. Municipals banded together; so did 150 investor-owned utility companies, hiring consultants to determine not only what the prices *had* been, but also what they *would have* been without the conspiracies.

Government Files Damage Suits. **March 20, p 56**

44 Utilities File Joint Suit. **Dec. 11, p 50**

These studies will continue as more information becomes available. In the meantime, and with an eye on a possible legal deadline this coming February, utilities have been filing damage suits in court. The federal government kicked off the first series last March and suits have been picking up in volume ever since. The number of both suits and plaintiffs now stands in the neighborhood of 200. Many more are expected.

How these suits turn out is another matter. There is always the possibility that the first series of suits decided in court may provide a formula for settling the other suits out of court. Other expeditious methods to handle the vast, docket-clogging number of suits might involve court appointment of a "master" or some form of arbitration. There is also the chance that many suits are being filed just for the public record, with the intention being of negotiating a settlement privately.

First Consent Decree Signed. **June 5, p 43**

GE-Government Hassle on Consent Decrees. **June 19, p 15**

In the meantime, the civil half (as against the criminal) of the government's antitrust cases have yet to be settled. One company has signed a consent decree, and the rest have indicated their willingness to do so. But General Electric is holding out, the main stumbling block being a clause that would prohibit selling at "unreasonably low" prices and putting the burden of proof on the accused. The outlook is that little will disturb this stalemate until the Supreme Court rules during this session on another case involving a similar issue. The substance of this decision could then signal whether either GE or the government modifies its stand, or whether GE decides to stand trial. Should the government be successful in getting the "unreasonably low" price clause, the consequences to the marketplace would be far-reaching. In the background is the government's half-hearted threat to try to break up GE.

Nevertheless, the periodically weak market conditions, which prompted the conspiracies in the first place, continue. Overcapacity in many product lines and resultant low prices still predominate in the marketplace.

Aggravating this soft market condition are confusion and the first signs of distrust between buyers and sellers. The unexpected nationwide attention to the Philadelphia cases caught both buyers and sellers off balance.

Kefauver Probes Suppliers. **May 29, p 46; June 12, p 47**

Later in the year, Sen Estes Kefauver held hearings on the electrical antitrust situation. If he expected public interest to be aroused again, he was disappointed.

Are Our Antitrust Attitudes Valid? **Dec. 11, p 97**

Not all of the reaction to the electrical cases has been unfavorable to the equipment manufacturers. There has been much clamor for re-examination of the workings of the US economic system, especially from those who recognize the fact that existing laws do not provide equal protection for all parties involved.

But the federal government is harshly prosecuting the existing law against the electrical industry. The impact of this enforcement is being felt heavily by buyer and seller, and the full force is still to be told.

Meanwhile, let's turn to the federal actions of the past year which impinge even more directly on the utilities.

New Frontier Makes Early Forays

Direct intervention of the federal government in the field of power supply was a towering reality. As one utility executive remarked, "Some people in Washington seem to think that the electric utility industry is a large part of the Administration's 'New Frontier.'"

Get Going Says NRECA. **July 24, p 27**

Going into 1962, it is clear that the roughest terrain is still ahead. In the power field, the Administration faces showdowns on such vital matters as federal expansion of transmission interconnections, more vigorous prosecution of hydroelectric construction, a bigger say in power matters generally. It seems likely it will be a do-or-die attempt to resurrect such projects as Burns Creek and Fryingpan-Arkansas, and to push action on the Bonneville-California intertie. Strong federal power advocates, miffed by the indecisive start of the Kennedy Administration, are plainly and publicly calling for a vigorous, coordinated drive.

Presidential Spending. **Nov. 6, p 53**

Udall Comments. **Sept. 18, p 99**

Two big questions yet unanswered may determine how far and how fast the Administration will move in the power field in 1962. These are: **1.** Is the President really serious in asking his Cabinet members to trim all unnecessary expenditures from their budget requests? **2.** How far does the Administration intend to go in working out a cooperative approach to transmission interconnections?

New Frontier. **Nov. 20, p 3; Nov. 27, p 3; Dec. 4, p 3**

Probing actions and skirmishes were the main features of the Administration efforts to stake a larger role for the federal government in the power field during 1961. Congressional tests were few but telling. Their outcome is bound to influence 1962 action.

Senate Gives Up. **Sept. 25, p 39**

Biggest setback came on the Administration-backed measure to install some 700-Mw of generation at the Hanford New Production Reactor. This proposal, to start with, was a bit outside the scope of the Kennedy power program. In retrospect, it represented a bold probing act to test the temper of Congress. Besides its questionable economics, this project would have set precedent by being the first large federal thermal generating plant outside the Tennessee Valley Authority area. A combination of electric utility, coal, and other business interests mounted an opposition that snowed it under.

Congress on Upper Colorado. **Oct. 2, p 62**

On the next test—a federal network for the Upper Colorado basin—the Kennedy Administration rolled out its big political guns. It managed to tame down Senate

Committee restrictions on federal construction of the lines. But Congress still suggested that the investor utilities might provide some of the lines.

On other proposals, such as Burns Creek and the creation of a Water Resources Council, Congress withheld its opinion either for lack of time or lack of conviction.

Kennedy's proposal to reappraise feasibility standards for federal projects never got beyond the Administration walls. Though he told Congress in February he was asking his Budget Director to conduct such an appraisal and report to him in 90 days, no more was heard from this one.

Federal Role. **Dec 11, p 57**

Almost unnoticed, the Administration did push through Congress a request for $300,000 to begin studies on giant tie lines to connect federal electric systems. This could well have been the legislative sleeper of the year.

Clapp Stresses G&T. **June 12, p 64**

Meanwhile, actions of the Rural Electrification Administration bear watching. Early in the year, REA Administrator Clapp announced he would loan funds to generation and transmission co-ops on a new criterion: to preserve the integrity of the cooperative system.

Again, here, some observers see a loophole through which substantial quantities of thermal plant and transmission can be built with federal funds. Again, it is Congress who controls the purse strings. But in this case, it cannot rule on individual projects, only on appropriations to a general lending fund.

Intertie Report. **This issue, p 48**

Had the Congressional encounters dimmed the Administration's determination to establish a bigger federal role in the power field? There were no sure signs that it had. It's true that Interior Secretary Stewart Udall seemed to be talking a little more earnestly about cooperation with investor-owned utilities on nationwide transmission plans. The report of the task force studying feasibility of the California-Bonneville tieline was temperate. But few observers were ready to write off the threat of stepped-up government encroachment.

Probably stronger and certainly more experienced in combatting federal intervention than ever before, the investor-owned utilities were able this year to call specific notice to their aggregate plans for expansion of their interconnections and pooling efforts over the '60s. Actually, planning activities leading to the announcement had been underway long prior to advent of the New Frontier.

Utilities Put US Pool Plans in Shade

Bureau to Build Lines. **Nov. 6, p 57**

The one Federal plan that was pushed through successfully during the year was the grid designed by the Bureau of Reclamation for the Upper Colorado River Project. After a bitter Congressional fight, USBR got appropriations to start the backbone of the system that it proposed against one offered by the five-state Rocky Mountain Group of investor utilities.

Still unsettled is who will build the last bits and pieces of the required network to move power from project's hydro to preference customers. Plans of the Rocky Mountain companies to interconnect their systems in Idaho, Utah, Colorado, Wyoming and Arizona at 230 kv and lower voltage are going ahead. But Interior Dept got what it wanted: a far-flung high-voltage system which sets the stage for tying its Hoover-Parker-Davis system through to its extensive transmission network in the Upper Missouri Basin.

Observers see the Upper Colorado lines as a vital link in a giant federal loop which would swing west from the Upper Missouri to the Bonneville Power Administration system, and then south to California and back to Hoover-Parker-Davis.

California Tie Study. **March 20, p 58-61**
DC Considered. **June 5, p 45**
Preference Involved. **Apr 10, p 3**

The proposed 900-mile BPA-California link, comprehensively reported on by states of California and Oregon, predictably was seized upon by Interior, which is now recommending it at ±375 kv dc. But Northwest preference customers are worried lest they lose regional energy to California preference users.

$8 Billion Plan. **Oct 9, p 42**

An $8-billion transmission plan that will permit complete interconnection of the investor-owned power systems and double the industry's transmission investment by 1970 was announced through the Edison Electric Institute. This was clearly the year's big news in interconnections.

The Plan contemplates upwards of 100,000 miles of new lines of all voltages to create a truly national power network. Interior Secretary Udall promptly tagged the plan a prelude to "a cooperative industry-government effort" and said the next step should be to integrate "consumer-owned" and federal transmission systems with those of the private industry.

Over the year, before and after EEI's dramatic announcement of the aggregate plans of investor utilities over the decade, news broke in a steadily-increasing stream from groups of individual utilities. Each news break gave concrete plans for extending and strengthening existing pools and interconnections. In some cases, non-investor utilities were full or partial members of the pools. Here are some of the important announcements:

8-State Grid. **Apr 17, p 50**
Swap Surpluses. **Oct 4, p 34**

Conceptual plans leading to a $300-million network comprising 4,000 miles of 345-kv and 230-kv lines in eight Midwest and Southwest states were proposed by 11 electric companies making up the 12,000-Mw Southwest Power Pool. Some five months later the same group proposed to like-sized neighboring TVA a seasonal swap of 1,500 Mw of surplus power. Such a swap of surpluses may require new transmission costing $90 million but generating capacity to do the same thing would cost 150 to $175 million. The proposal is still in friendly negotiation.

Meanwhile in Texas plans were drawn to build a $25-million 800-mile 345-kv line from Houston to the Dallas-Ft Worth area and on to Permean Basin. The line would link 27 steam stations with a capability of 6,500 Mw and tie together the North and South Texas Interconnected Systems.

Missouri Basin Plan. **Nov 6, p 54**
Upper Mississippi Pool. **Jan 16, p 44**

Hopes for the long-considered Eastern Missouri Basin interconnection, linking private and public power systems in Minnesota and the Dakotas, brightened late in the year. Some 14 utilities came forward with a proposal to Interior that 650 Mw in federal hydro system in the Missouri Basin be integrated and firmed with locally owned thermal plants in the area. A major contributor to this would be the 3,100-Mw Upper Mississippi Valley Power Pool formed this year.

Dixie Pool Plan. **Oct 25, p 37**

Four utilities in the Carolinas and Virginia signed a pooling contract that will let them capitalize on the economies of 500-Mw units and 1,000 to 1,200 Mw plants and reap the economy and security of pool operations. They plan to overlay with a 500-kv grid their present 110- and 230-kv transmission systems.

NY State Grid. **July 3, p 33**
SENY State Pool. **June 19, p 131**

Under a cooperative plan between PASNY and power companies in New York State, a $250-million 345-kv backbone was being stretched from Niagara to New York City. Overlaying the utility 115-kv networks, it links steam and hydro generation in the north and west with seven centers of load and generation across the state and ties it with the brand new 7,000-Mw S. E. New York State Pool. This pool

1,000 Mw Unit Ordered. **Oct. 2, p 63**

figured prominently, its first year, in Con Edison's decision to order the world's first 1,000-Mw turbine generator.

345 Kv NE Intertie. **Oct. 25, p 37**

Not unrelated to interconnection and pooling in New York State were plans of New England utilities to mount a $1-billion transmission and generation program. Key project is a 400-mile 345-kv line starting north of New York City and running across Connecticut, Rhode Island, Massachusetts, New Hampshire and into Maine.

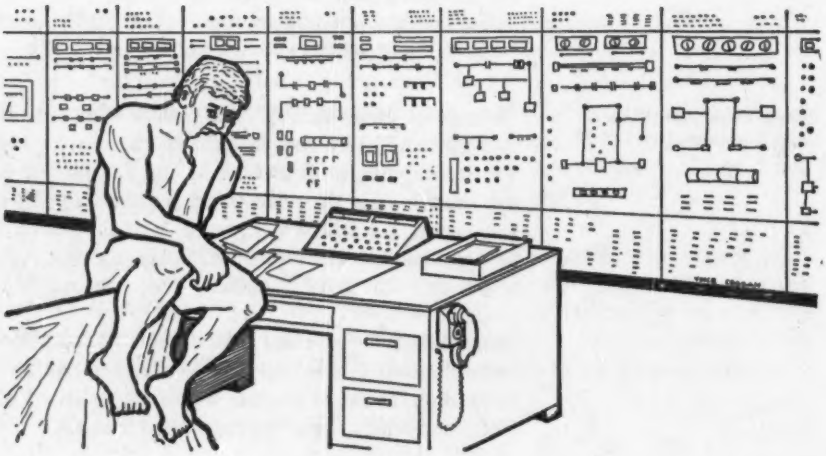
Florida Plan. **Dec. 11, p 52**

Meanwhile in Florida, three companies and a municipal system created a group to coordinate planning and operation. Also at year end, AEP and Illinois Power announced a single-circuit 300-Mw 345-kv intertie that will link their systems and firm the ties between regional power pools in the Midwest.

California Pool Planned. **This issue, p 34**

This issue reports that the four principal California investor utilities, aggregating over 10,000-Mw capacity, have completed plans to pool their resources for mutual emergency aid and to permit economies of operation.

Judging from the volume of hard news which can be cast in terms of physical lines, then, the investor-owned utilities this year clearly outdistanced the federal government. Yet the overlying threat of clear federal intent in the near future hangs like a cloud over the whole scene.



Technological Evolution Continues

Increased federal activity in other areas of the power industry could well raise speculation as to what direct interest the Administration might take in technical development. The federal government has not previously financed electric power R&D except in the special instance of nuclear power. But though nuclear could be a precedent, even here 1961 saw developments supporting the long-range prospect that the Atomic Energy Commission would phase itself out of the civilian power side of its activities.

Nuclear Fuel Ownership. **Oct. 23, p 37**

The year marked the founding of the Commission's Division of Industrial Participation, which meets with industry next month; the announced desire of the

AEC to turn nuclear fuel ownership over to industry; and, outside the government, the formation of a national policy committee by the Atomic Industrial Forum, which has a voice with the Commission.

In technical development, the year was more evolutionary than revolutionary, but with faster evolution than many expected a few years ago. The million-kw unit, the upsurge of unit sizes generally, work on "exotic" topping cycles, heavy ordering of first-generation computer control of steam units, and proliferation of EHV transmission planning, all are good examples of the evolution.

1000-Mw Unit. **Oct. 2, p 63**
Computer Control in Steam Plants. **Nov. 27, p 35**

The first of these came this year when Consolidated Edison Co announced a giant unit, made feasible by the company's new and projected interconnections. This year, also, computer control and data logging installations went into operation in ten plants and an equal number of substations in the US and Canada to show the increasing impact of this equipment.

Eddystone. **Nov. 27, p 32**

Chalk Point. **Oct. 23, p 107**

Bodega Bay **July 10, p 64**

Yankee and Dresden Experience. **Nov. 27, p 34**

Elsewhere in generation, Philadelphia Electric Co brought its two-unit, 5,000-psi Eddystone Station to full rated 1,200F. The two projected Chalk Point units showed extension of interest in supercritical steam plants to a medium-size utility, Potomac Electric Power Co. A large one, Pacific Gas & Electric Co, stated its coming 325-Mw Bodega Bay nuclear unit will produce 5.62-mill energy, heralding the emergence of nuclear power competitive in high-fuel-cost areas. Of equal interest to nuclear men has been the experience at Dresden and Yankee, both of which came up successfully to full load and have run for several months with a minimum of difficulties.

Coal Slurry. **Nov. 20, p 52**

Continued interplay of forces in the fuel picture brought some developments, mostly favorable toward stabilizing costs. Successful combustion without drying of a coal slurry demonstrated that the coal pipeline is still very much in this picture. The threat of nuclear appeared to be a factor in holding the fuel price line in such areas as New England. A factor operating in the same direction has been EHV, which moved up another testing notch to 775 kv at Apple Grove.

Apple Grove. **July 3, p 30**

Channel Crossing. **This issue, p 37**

An interconnection abroad also highlighted high-voltage progress when the 200-kv dc under-Channel cable went into service to carry 160 Mw between France and England. Helping high-voltage construction, the bare-hand technique for working overhead lines from aerial baskets, though originated in 1960, has been developed by American Electric Power System into a full-grown work method.

Computers in Distribution. **Dec. 18, p 45**

Small Crews. **Sept. 18, p 102**

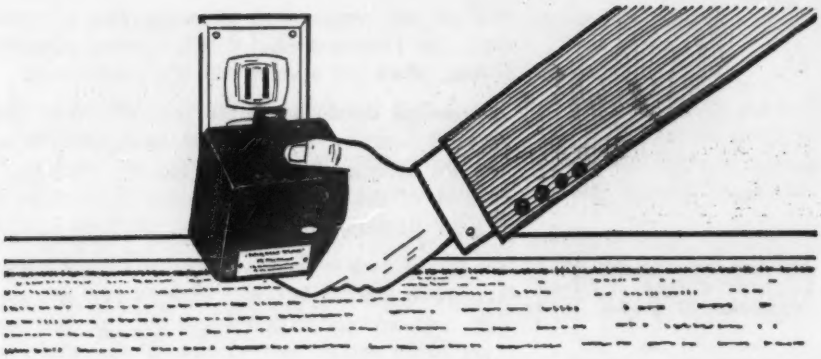
Standard Pad Mount. **Nov. 13, p 51**

Distribution, relatively not spectacular as usual, was marked by the continued growth of methods introduced earlier into practice. Simulation of systems and analysis of performance, both by computer, grew, as did mechanical construction methods, such as bucket trucks with two and three-man crews. Specifically new is the setting of standards for pad-mount transformers, at least by West Coast buyers. The 65C-rise distribution transformer with low losses has gained acceptance, although utilities are still unable to agree on the worth to assign to losses. This seemed to mean the end for the 55C and dual-rated models and, happily, the confusion that the latter brought.

There would seem to be no logical reason, then, in the area of technological developments, to expect government intervention, now or in the distant future. With the sole exception of the nuclear field, electrical manufacturers and their customers have demonstrated that, operating as a team, they are perfectly able to keep the flow of innovation and more efficient systems moving at a pace adequate to support the needs of the industry.

The bulk of the R&D funds supporting this effort comes directly from the manufacturing partner of the team, though of course these funds must be supported in the prices of the products sold. On their own, utilities are stepping up their own R&D expenditures in application areas.

The danger, however, though seemingly now remote, is there. Should the manufacturers falter in this continuous job, and should the alliance between maker and user weaken perceptibly, a vacuum would be created. And the overall tendency today is for the federal government to move into a vacuum.



Confusion Reigns on NEAR

Details and Tests of NEAR System Released in OCD Final Report. **Dec 4, p 68**

Civil Defense Alarm Proves Feasible. **Feb 16, 1959, p 84**
Full-Scale NEAR Test Is Successful. **Oct 31, 1960, p 50**
Administration Rushes NEAR Alarm Program. **Nov 6, p. 56**
OCD Aims for NEAR in Several States. **Nov 20, p 48**

Editorial—NEAR Program Puts Utilities On Spot. **Nov 13, p 45**

OCD Backs Off on Wiring NEAR Devices. **Nov 13, p 48**
OCD Spells Out Division of Responsibilities for NEAR. **Nov 27, p 26**
Government Moving Ahead With Studies. **Dec 18, p 37**
Status of NEAR Program Still Cloudy. **Dec 10, p 36**

Taking the utility industry completely out of its normal sphere of operation, the Federal Office of Civilian Defense this year tried to push a crash program to use utility lines for a 240-cycle air raid alarm system.

The National Emergency Alarm Repeater system, involving well over a billion dollars of transmitters and receivers (one receiver per home), is based on one successful system test in Michigan. Obviously trying to show some results after years of public apathy to civil defense, the OCD, now under the Defense Dept, decided on this very ambitious program, irrespective of state laws, regulations, financing difficulties, etc. One further difficulty OCD quickly found it faced: the government was not to pay for any of this.

Almost predictably, confusion appears to have stalled the intended crash installation of NEAR equipment. The confusion centers around these areas:

OCD has announced no firm policy. It has vacillated from plan to plan. Under one, the government would provide signal generators and sell receivers to the public; in another, utilities would buy, install, and maintain the generators and receivers and seek rate relief; with yet another, federal loans are offered for generators to be installed by the utilities, and customers would be billed by the utilities for simple plug-in receivers.

The public, and privately many utilitymen, investor and non-investor, feel that such a program cannot fly on a basis where the citizen is free to choose whether he wants protection. Until government policy is announced for a mandatory program, financed federally, many feel the long-term apathy will prevent full acceptance.

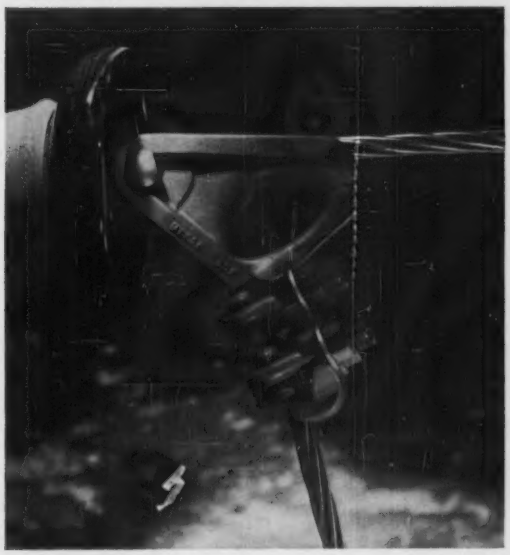
Others think there are better ways than using utility lines as carrier circuits. But generally, most agree that the industry must offer full cooperation to any program bearing the term "defense" in the title. Most utilities probably will consider seriously anything OCD finally settles down on.

The regulatory difficulties in many jurisdictions, for most of the plans, would be terrific, with precedent broken in all directions. OCD has talked to several commissions, and still apparently feels commissions generally will be cooperative in helping the utilities solve the problems and recover the staggering costs.

What's the significance of the NEAR situation? The utilities know they dare not do otherwise than comply, even though the government way may not be the best way, even though the whole thing flounders miserably under public apathy, even though they might well be blamed by their customers for federal ineptitude.

The alternative to compliance is to invite attack by those seeking ever greater federal control of the power industry.

ALCOA ALUMINUM
ACCESSORIES ROUNDUP



Wider-range bolted full-tension dead end clamp

This is the new Cat. 302 dead end clamp. It's a companion to the recently introduced 301, with which it shares many common features. A full-tension clamp, the new 302 holds a minimum of 95% of the rated strength of conductors for sizes 2-6/1 to 266.8 18/1 ACSR. When paired with the 301 (handling sizes No. 6 to 2/0 ACSR), the two take the place of *three* previously available clamps for the range of sizes covered. Thus, it is possible to simplify inventories by standardizing on these *two* clamps.

The Cat. 302 clamp is cast in one piece of a high-quality, corrosion-resistant aluminum alloy. The two ½-inch U-bolts are also of high-strength aluminum alloy, which means that all parts surrounding the conductors have equalized coefficients of thermal expansion. The bolts are supplied with an Alumilite 205 finish and grease film. They withstand corrosion and are easy to tighten, since the threads are accurate and smooth. And because the bolts are long, to give plenty of clearance, installation is convenient.

For ease of aligning the cotter pin hole, the galvanized steel clevis pin has a clipped edge. The pulling eye, an integral part of the clamp structure, is large, so it's easy to use the hoist hook.

Off-the-shelf delivery of the new Cat. 302 dead end clamp is available. Your nearby Alcoa-Rome representative can supply information on delivery, price, or the clamp itself.

"Extra-large" accessories

The small compression joint—barely visible here—is a service entrance connector used on No. 2 conductor. The other one is designed for a full-tension splice of 2.32-inch diameter expanded ACSR. Many of today's installations—particularly EHV—require "extra-large" dead-ends, joints, armor rods and other accessory parts. Alcoa meets the need for small, medium, large or even "extra-large" accessories.

→

Stockbridge dampers–Aeolian vibration control

by C. B. Rawlins, Research Engineer, Alcoa Research Laboratories, Massena, N.Y.

The Stockbridge damper is an energy dissipation device removing the energy of vibration imparted to a conductor by wind. It consists of a clamp attached to the conductor and a stranded steel cable connecting a pair of bell-shaped inertia weights to the clamp. Conductor vibration induces a relative motion between the clamp and the inertia weights. This in turn causes flexure of the steel cable, resulting in dissipation of mechanical energy by friction between the strands of the damper cable.

The effectiveness of the damper depends strongly upon how efficiently the vibration motion of the conductor can be translated into the flexure of the damper cable. The damper will dissipate energy for any wind velocity at which vibration of the conductor is translated into sufficient flexure of the damper cable to produce interstrand slipping.

In contrast to most tuned damping devices, which operate best only near their natural frequencies, the Stockbridge damper is designed for efficient transfer and dissipation of energy at frequencies far from its two natural frequencies. In fact, the most efficient performance generally takes place at frequencies which are above the natural frequencies.

Under most field conditions, properly selected dampers, properly spaced, are effective in eliminating damaging vibration. Damper sizes for various conductors are listed in Alcoa catalog DC2A. Spacing rules are specified in the publication "Notes on the Application of Stockbridge Dampers."

For unusual vibration conditions or line construction, special engineering consultation is available through Alcoa-Rome sales offices.

Hydraulic compressor versatility

What types of compressors (and how many of each) are enough? Your answer to both questions depends on the nature and scope of your operations. This is why we offer such a wide choice in compressors. Check the latest published data from Alcoa on this subject; there are five hydraulic compressors alone listed as current. Herewith is a brief run-down.

MODEL 12A • Small and light weight (a mere 11 pounds), it's suitable for ground or aerial operation. Hand operated, it provides a thrust of 12 tons. It features conveniently located controls, adjustable die gap, rapid piston advance and a C-head that's rotatable through 180 degrees.

Model 12HA • This one is also lightweight and has a full 12-ton thrust. Designed primarily for swift installation of ALCOA Tubular Compression Accessories. Its small size and the fact that it can be operated in any position by a remote pump make it well suited for use in close or cramped quarters or with Alcoa's new hydraulic hot stick.

Model 60A • A proven rugged, fast, convenient portable tool for ground or aerial use, it delivers 60 tons of thrust for maintenance or construction with any commercial conductor sizes and tubular accessories. A remote pump can be hand operated or driven by either electric or gasoline power.

Model H2 • With a thrust of 100 tons, this heavy-duty tool is capable of handling a full range of conductors. The compressor can be operated by integral hand pump or with a powered hydraulic pump. The two hand pumps provide a high speed for raising the piston until it contacts the accessory to be installed, and a low speed for closing the dies.

Model H2H • A simplified and lighter-weight version of the H2, this tool can be operated in any position. It is designed specifically for use with a remote pump for extra speed and versatility. Pumps for hand, electric motor, or gasoline engine operation are available.

Summing up: Alcoa's new Cat. 302 dead end clamp becomes a companion to the Cat. 301—together taking the place of *three* previously available clamps.

Extra-large accessories put a wide range of sizes at your disposal.

Stockbridge dampers are designed for efficient energy dissipation over a wide range of frequencies.

Alcoa's broad line of compressors provide the answers to the questions of what type? how many?

Your nearby Alcoa-Rome salesman is eager to supply additional information on any or all of these items. Why not call him today? For the name and address of our nearest representative, write to Rome Cable Division of Alcoa, Dept. ACR-4, Rome, N. Y.

ALCOA
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DIVISION

Dow Chemical Discusses R/W Clearing Problems with 32 Utilities

Fifty one representatives from 32 utilities, recently gathered in Atlanta for a conference on right-of-way clearing, were told by Dow Chemical Co of latest developments in the field, how best to apply chemicals and what kinds of chemicals to use for different jobs.

On brown-out resulting from spray, it was recommended that utilities keep garden clubs informed, pointing out to them that the browning is temporary and that in a short time plant appearance will be better than ever. The public should also be informed that materials used in brush control work are not toxic to wild life or people.

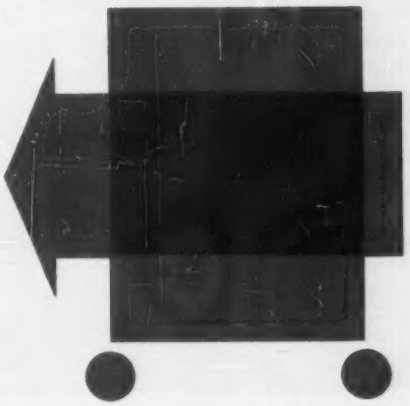
Dow emphasized that claims, whether against the utility or a contractor, should be handled promptly; that if the claim is justified, a fair and equitable settlement should be reached as soon as possible, and, that where the claim is not justified it is imperative that the landowner be convinced that there is no basis for his claim.

It was learned that thickened sprays are being used more and more in helicopter spraying. The thick-spray material costs more than other sprays but offers an additional safety factor against drift of the chemical and damage outside the right-of-way area. "Clearing" results of the thickened spray and the conventional mixtures are comparable. Benefits of fewer claims must be weighed against the added spray costs.

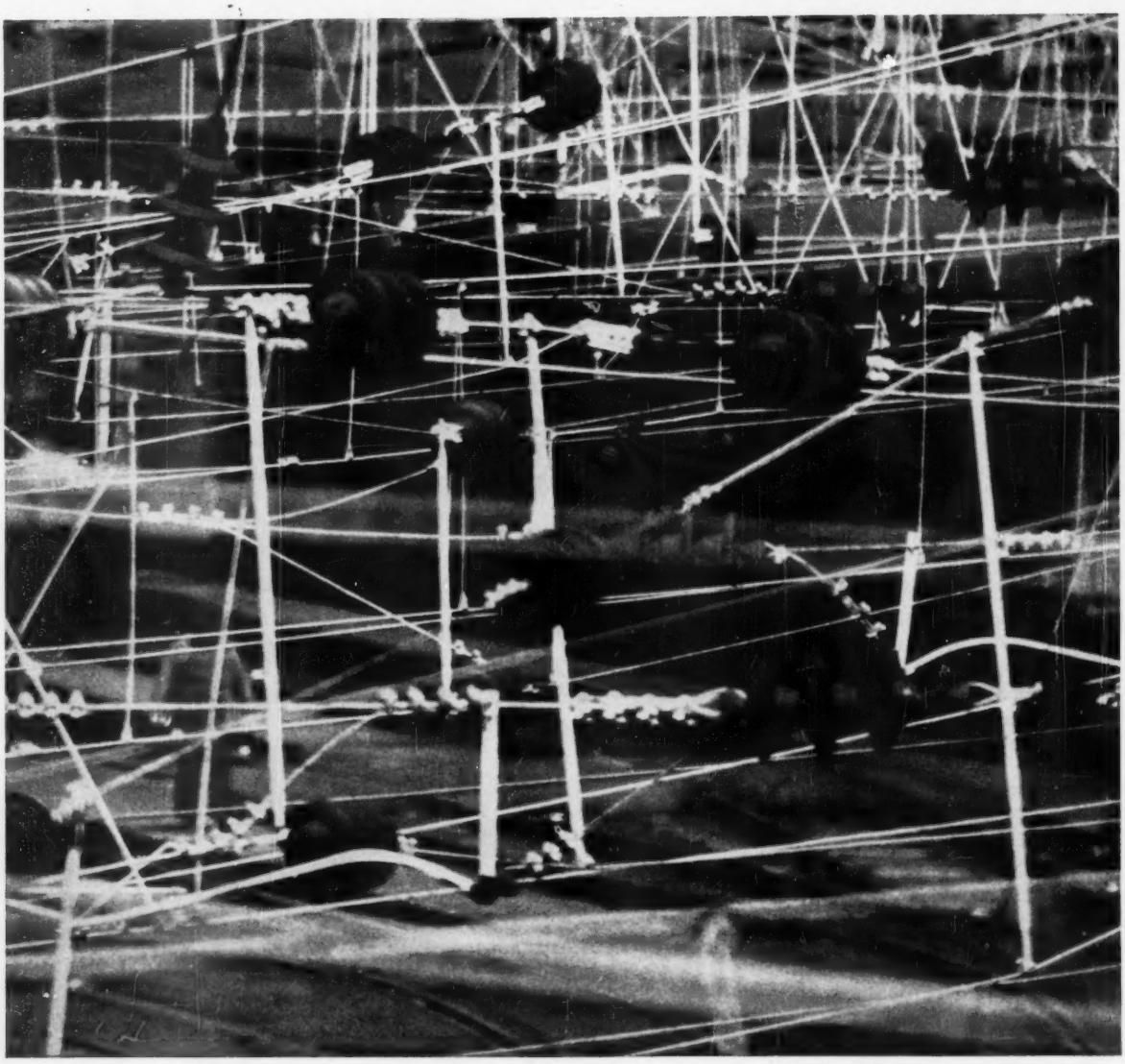
MANUFACTURERS BRIEFS

• **Thompson Ramo Wooldridge Inc,** has announced availability of the third in its line of industrial control computers—the TRW-530. It is said to be applicable in the electric power industry to complete power station automation and to automatic power dispatch. Employing Stored Logic, the digital computer is designed for industrial process control, scientific computation and data processing. Stored logic is described by TRW Inc as an advanced concept in computers which tailors the new

A Westinghouse Metal-Clad Switchgear advantage to you:
Horizontal drawout construction of DH breakers makes inspection, maintenance and replacement quick and easy



For complete facts on Westinghouse metal-clad switchgear using DH magnetic air circuit breakers, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61022



Where will you get new capital for the power-hungry '60s?

The privately owned electric utility industry plans to spend $3.5 billion on new and improved facilities in 1962. And over the next five years it expects to spend almost 20% more on expansion than it has in the past five.

As a vital, creative link between the electric utility industry and money sources, Kidder, Peabody has long experience and leadership in raising debt and equity funds through private placements and underwritings.

In 1960, we managed or co-managed the underwriting, sale and distribution to the public and to institutions of 32 new utility issues amounting to more than $214,000,000.

Our 27 offices coast-to-coast have the extensive contacts and facilities needed for prompt, economical distribution of new issues. Our experience and long-established connections with private and institutional investors bring us, every year, large quantities of private placement business. Call or write us for detailed information on how we could help your company meet its requirements for additional capital. Offices in New York, Boston, Philadelphia, Chicago, Los Angeles, San Francisco. Members New York, American, Boston, Philadelphia-Baltimore, Midwest and Pacific Coast Stock Exchanges.

Kidder, Peabody & Co.

FOUNDED 1865

20 Exchange Place, New York 5, N. Y.

A partial listing of recent issues: *Alabama Power Company · Atlanta Gas Light Company · Brockton Edison Company · California Electric Power Company Carolina Power & Light Company · Central Hudson Gas & Electric Corporation · Central Louisiana Electric Company, Inc. · Community Public Service Company Delaware Power & Light Company · Fall River Electric Light Company · Florida Power Corporation · Florida Power & Light Company · Georgia Power Company Idaho Power Company · Interstate Power Company · Kansas Gas & Electric Company · Louisiana Power & Light Company · Maine Public Service Company Missouri Public Service Company · New York State Electric & Gas Company · Pacific Power & Light Company · Pennsylvania Electric Company · Public Service Company of New Hampshire · South Carolina Electric & Gas Company · Southern Nevada Power Company · Tampa Electric Company · Texas Power & Light Company · Upper Peninsula Power Company · Washington Water Power Company · Wisconsin Power & Light Company*

computer to the needs of each user and gives it capabilities equal to the most complex control job. In addition, the computer offers parallel operation, large core memory and microsecond operating speeds. The unit communicates directly with process instruments and controls through analog and digital input-output equipment. Ten TRW-530's are on order for industrial data processing applications.

• **General Electric Co** has received an order from Gulf States Utilities Co to build what reportedly will be the world's highest capacity mobile substation. The 25-Mva record rating of the unit will top the 22-Mva of a previous order for GE (said to be an industry high at the time). The mobile unit's voltage of 138 kv is said to be another record level; this voltage is being incorporated into several mobile substations in production at GE's power transformer department, Pittsfield, Mass. The substation will be mounted on a highway semi-trailer and will consist of a high-voltage disconnecting switch, lightning arresters and fuses, 3-phase, forced-oil-cooled power transformer, low-voltage switchgear and control and relaying equipment.

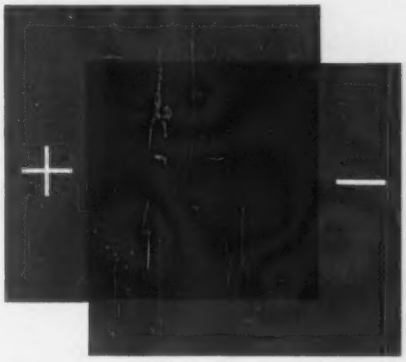
• **Westinghouse Electric Corp** will build the turbine and generator, and **Riley Stoker Corp** the boiler and associated equipment for Carolina Power & Light Co's modern 200-Mw generating plant near Skyland, N. C. The boiler will produce about 1,400,000 lb of steam per hr, superheated to 1,000F, to drive the turbine. A network of 13 miles of tubes and pipes will be part of the huge boiler. The assembly is expected to be barely audible when operative, with an output of more than a billion kwhr annually. The plant will be completed in 1964.

• **American Machine & Foundry Co's J. B. Beaird Co,** Shreveport, La., will distribute and market the Saf-T-Boom, manufactured by the Saf-T-Boom Corp, Little Rock, Ark. The boom, installed on any large industrial-type crane up to 20 tons or larger, protects crane operator and groundmen by providing the top part of the crane with protective insulation. Saf-T-Boom Corp

(*More News of Manufacturers, p* 59)

A Westinghouse Metal-Clad Switchgear advantage to you:

Limitrak* insulation system provides superior, balanced protection



For complete facts on the total Limitrak insulation system used in metal-clad switchgear, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
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TERESSO® TURBINE OILS GIVE YOU TRIPLE PROTECTION!

Premium-quality Teresso turbine oils are triple-inhibited for protection against rust, foaming, and the formation of harmful sludges. Their high viscosity index minimizes the natural tendency of oils to thin out at high temperatures and to thicken at low temperatures. Entrained water separates readily from Teresso turbine oils.

Teresso has long enjoyed a top position in the lubrication of turbines and other precision machinery. It is manufactured from fine paraffinic-base stocks selected for exceptional oxidation resistance. Advanced refining methods and special additives further its long service life.

UNIVOLT® oils for transformers offer excellent dielectric strength and low power factor. Their high-temperature stability is especially valuable during peak load periods. Your Esso Representative can help safeguard your dependable service. Give him a call, or write to us at 15 West 51st Street, New York 19, New York.

HUMBLE OIL & REFINING COMPANY

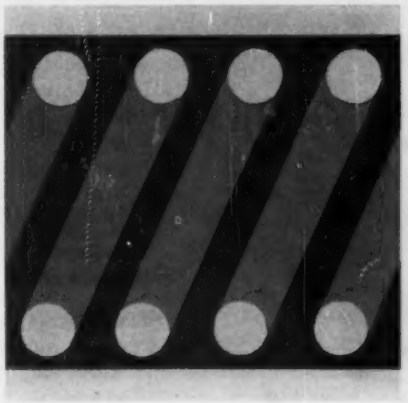
will continue to use its own distributors in Ark., Tenn., Ga., and Fla.

• **Remington Rand Division** of Sperry Rand Corp has announced its purchase of **National Data Processing Corp,** Dallas, Tex., which has been engaged in development, manufacture and marketing of Magnetic Ink Character Recognition (MICR) equipment. It is used for automatic processing of checks and other documents. Product line includes encoders, document processors and audit listers. In addition to the currently marketed products, National Data is engaged in advanced development work on MICR equipment incorporating new principles.

• **Multi-Amp Electronic Corp's** President I. M. Goss forecasts, in a half-year report for the period ended Oct. 31, "This is our 'breakout' year. New records were set once again in sales, production and shipments. In our new plant, employment has increased three-fold to support our world-wide sales effort . . . Our forecast for this fiscal year will be surpassed by more than 50%." And he also pointed out that Multi-Amp's electrical test instruments and power supplies have proved their value on the score of creating greater efficiency for customers numbering some of the world's largest utilities and industrial companies.

• **Westinghouse Electric International Co** has announced a technical assistance agreement has been reached whereby **Mitsubishi Atomic Power Industries, Inc,** of Tokyo, will be licensed to manufacture nuclear reactors and associated auxiliary equipment. The agreement, approved recently by Japan's Ministry of International Trade and Industry and the Ministry of Finance, covers closed-cycle water reactors as well as future types developed by Westinghouse. Nuclear engineers from the Japanese firm have arrived in the United States for a year of studies and observations with the Westinghouse atomic power department in Pittsburgh, Pa. According to a Westinghouse spokesman, "Japan is among the nations best suited to utilize atomic energy immediately to meet their growing power requirements."

A Westinghouse V-2 Disconnecting Switch advantage to you: **Totally-enclosed counterbalancing mechanism rides on almost frictionless Delrin rollers — provides proper blade balance in any mounting position, under all conditions**



For complete facts on V-2 disconnecting switches, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61024

New Equipment

Dead-end Guy Anchor . . .

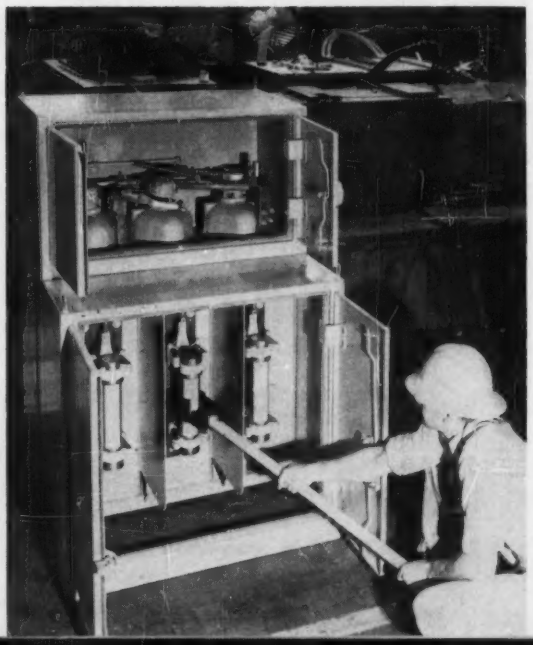
. . . has extra-large eye offset from the center line of the anchor rod, which provides ample space between the guy and the chain hoist for unrestricted wrapping-on of the legs of the dead-end. The new pulling eye, made of corrosion-resistant nodular iron, is said to withstand 15,000 lb of pull. The keeper adapts the pulling eye to anchor rods of ½, ⅝ and ¾-in. diameters. The tool is used without keeper on 1¼-in. anchor rods. A coat of vinyl protects the pulling eye from corrosion.
Preformed Line Products Co, 5349 St. Clair Ave, Cleveland 3, Ohio

◂ Oil Circuit Recloser . . .

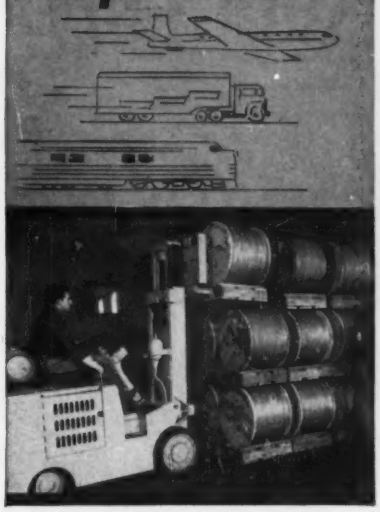
. . . is adaptable to growing single-phase systems which require protection at higher load and fault-current values. The Type D single-phase recloser can interrupt fault currents ranging from 6,000 to 12,000 amp and is said to offer reliable and economical single-phase protection for distribution circuits rated 2.4 through 14.4 kv. Minimum tripping current ratings can be changed with a simple replacement of the series trip solenoid. Eight series trip solenoid ratings are available from 100 through 560 amp, with minimum tripping currents of 200 through 1,120 amp. The recloser, completely self-contained, is normally pole-mounted and needs no accompanying control or auxiliary source of power. It reportedly will clear temporary faults in 2½ cycles.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

Load Switcher/ Overcurrent Protector . . .

. . . provides coordination of switching capability (900 amp at 0.8 pf) and fusing characteristics to safely switch any current which will not cause fuse melting. Development of the new F/O (fused-oil) interrupter switch is said to be made possible by its two main components: the GE oil cutouts with improved switching ability and EJO-1 current-limiting power fuses with higher short-circuit interrupting capacity. These are connected in series and housed in an attractive, easy-to-install unit compartment. Reportedly, in most cases, only the cutout's oil-fuse links need to be replaced when overloads or high resistance faults occur. F/O interrupter switches are available at 5.2 to 15 kv. They are 5 to 6 ft high, 3 to 4 ft wide and deep, and weigh 800 to 1,200 lb.
General Electric Co, Schenectady 5, N. Y.



Prompt Emergency Shipments



Crapo GALVANIZED STEEL STRAND

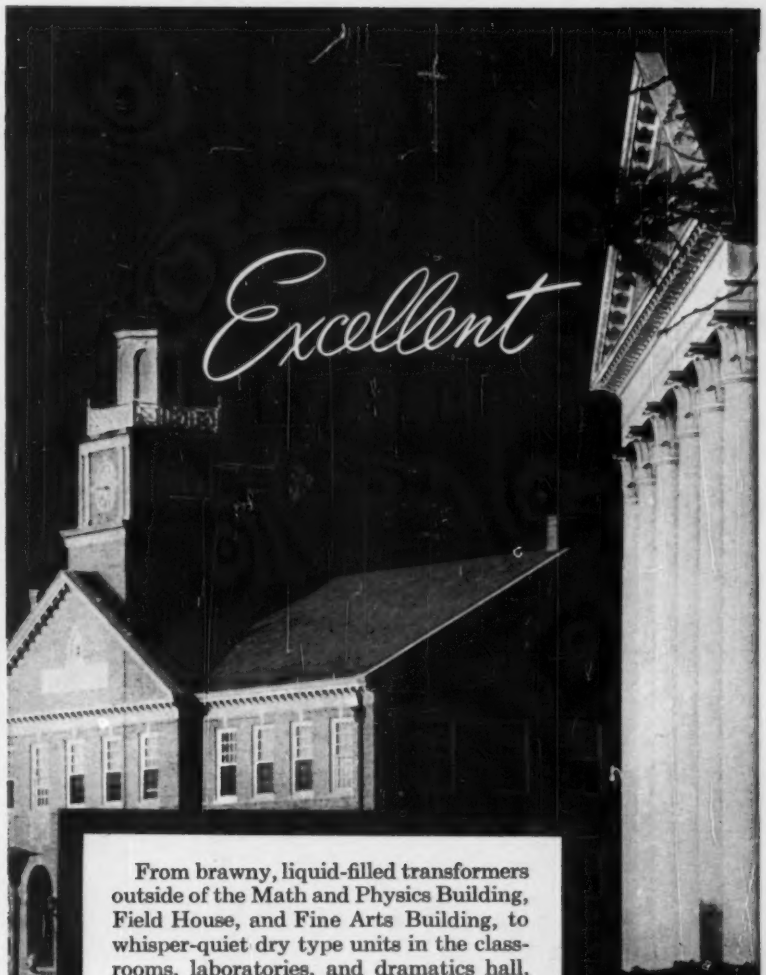
When in need of guy or messenger strand during an emergency, be sure to contact the nearest distributor of ***Crapo*** Galvanized Strand! Substantial stocks are maintained at strategic distributing points throughout the country ready for immediate delivery. Back of these stocks are our own extensive mill stocks of finished strand, and strand in process. If your jobber does not have all of your requirements, he knows he can depend upon us for immediate shipment of popular sizes and grades by air, truck or rail.

You, in turn, can rely upon ***Crapo*** Galvanized Steel Strand, at all times, to give you the utmost in performance at reasonable cost.

Crapo Galvanized Steel Strand is manufactured in all standard sizes and grades and in three weights of coating: Class A, B and C.

Phone the distributor of *Crapo* Galvanized Steel Strand near you the next time you need strand.

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana



UNIVERSITY OF WICHITA

From brawny, liquid-filled transformers outside of the Math and Physics Building, Field House, and Fine Arts Building, to whisper-quiet dry type units in the classrooms, laboratories, and dramatics hall, the University of Wichita uses Marcus transformers for dependable, trouble-free performance.

All Marcus transformers, both dry and liquid-filled score "excellent" in factory tests. Loss tests, hi-pot tests, impulse tests, and sound-level tests are passed with flying colors. For full power and guaranteed satisfaction, specify Marcus for *your* next transformer installation.

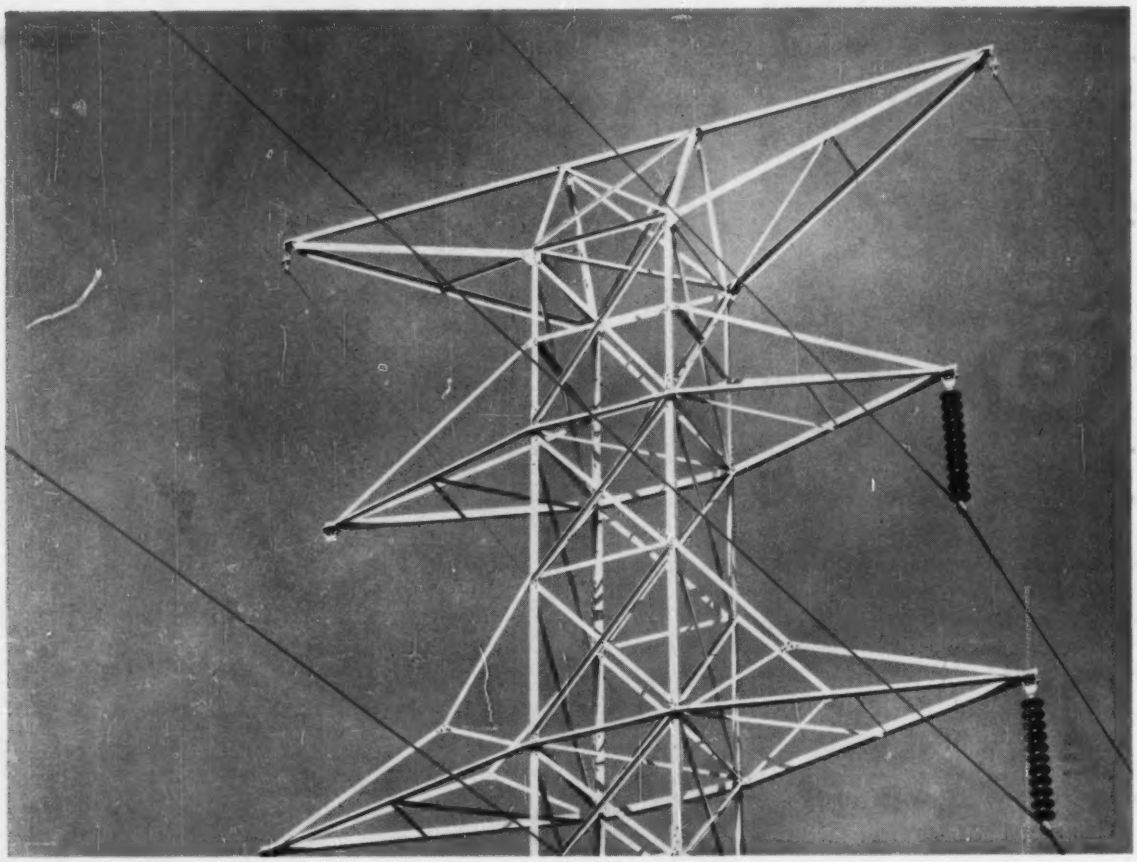
MARCUS MTC "Mark of Quality"

Representatives in Principal Cities

1500 KVA OIL FILLED TRANSFORMER

MARCUS TRANSFORMER CO., Inc.
RAHWAY, NEW JERSEY

A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA



Use Insulated Shield Wires for Carrier

Carrier-current communication is being conducted over insulated overhead ground wires of a 161-kv line by Tennessee Valley Authority. TVA believes this is the highest line voltage for this type of installation, although the transmission of carrier on overhead ground wires is not new. The circuit runs 100 miles over steel towers from Colbert Steam Plant, Ala., to Columbus, Miss.

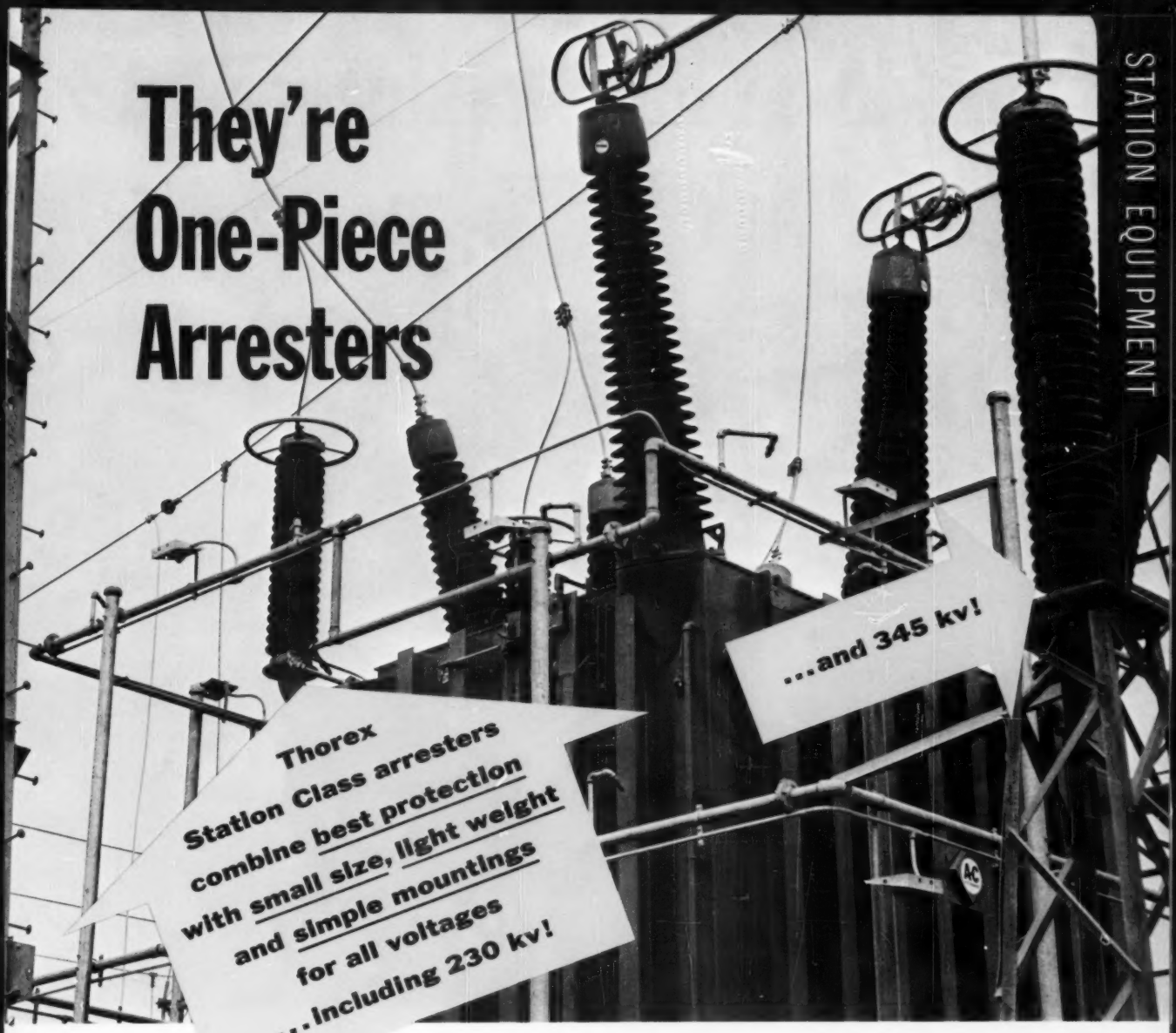
Each of the two shield wires on this transmission line is suspended from each tower arm by two strain clevises and a 15-kv guy strain insulator with a ⅞-in. gap across it. The shield wires are 21 ft above the power conductors on 33-ft spacing, and they are transposed at four intervals. They are terminated in a transformer with horn gaps and a high-capacity ground relay to provide drainage and protection. TVA does not expect the insulation of the wires to detract from their main purpose as lightning protection.

Extensive tests with the transmission line energized and deenergized demonstrated that:

- The carrier attenuation of the shield wires was about the same as the phase-to-ground attenuation of transmission conductors in the 30 to 200-kc range, 0.1 db per mile. The shield wires, however, can conduct carrier from 5 kc to the upper limits of carrier equipment frequencies with loss varying from 0.05 db per mile at 5 kc to 0.20 db per mile at 250 kc; and
- The zero-sequence impedance of the line with the insulated shield wires was the same as that calculated for such a line without any insulation.

As a further test, a continuously recording circuit has been established on the shield wires, each of which consists of three No. 5 stranded Alumoweld, to determine the effect of lightning or other inductive influences.

Initially, two telephone circuits and one frequency-type telemetering channel were installed with instruments to collect information. The installation provided substantial saving in cost over one with the carrier transmitted over the power conductors.


They're One-Piece Arresters
...and 345 kv!
Thorex Station Class arresters combine best protection with small size, light weight and simple mountings for all voltages ...including 230 kv!

These one-piece arresters are the smallest and lightest arresters on the market. Only 9½ feet tall and 1050 pounds for the 345 kv arrester and 7 feet, 817 pounds for the 230 kv arrester. Lower voltage models are much smaller, much lighter.

Even the highest voltage arresters are especially simple to mount. Support them on a pipe-mount on the transformer, on a plain pedestal or even hang them within the station structure.

They're single units, complete, ready to operate; so just swing them up in place right from the crate. Two men and a hoist can do it - - in only a few minutes apiece.

Just think - - savings in mountings and installation time can quickly add up to the price of a Thorex Station Class arrester.

Besides this convenience and economy, Thorex also brings you the best protection available. Lowest IR discharge, best thermal durability, dependable service even in high contamination areas comes to you at no extra cost in the Thorex Dynagap Station Class lightning arrester.

For the best performance and the best *installed* arrester price, put Thorex arresters in your new stations.

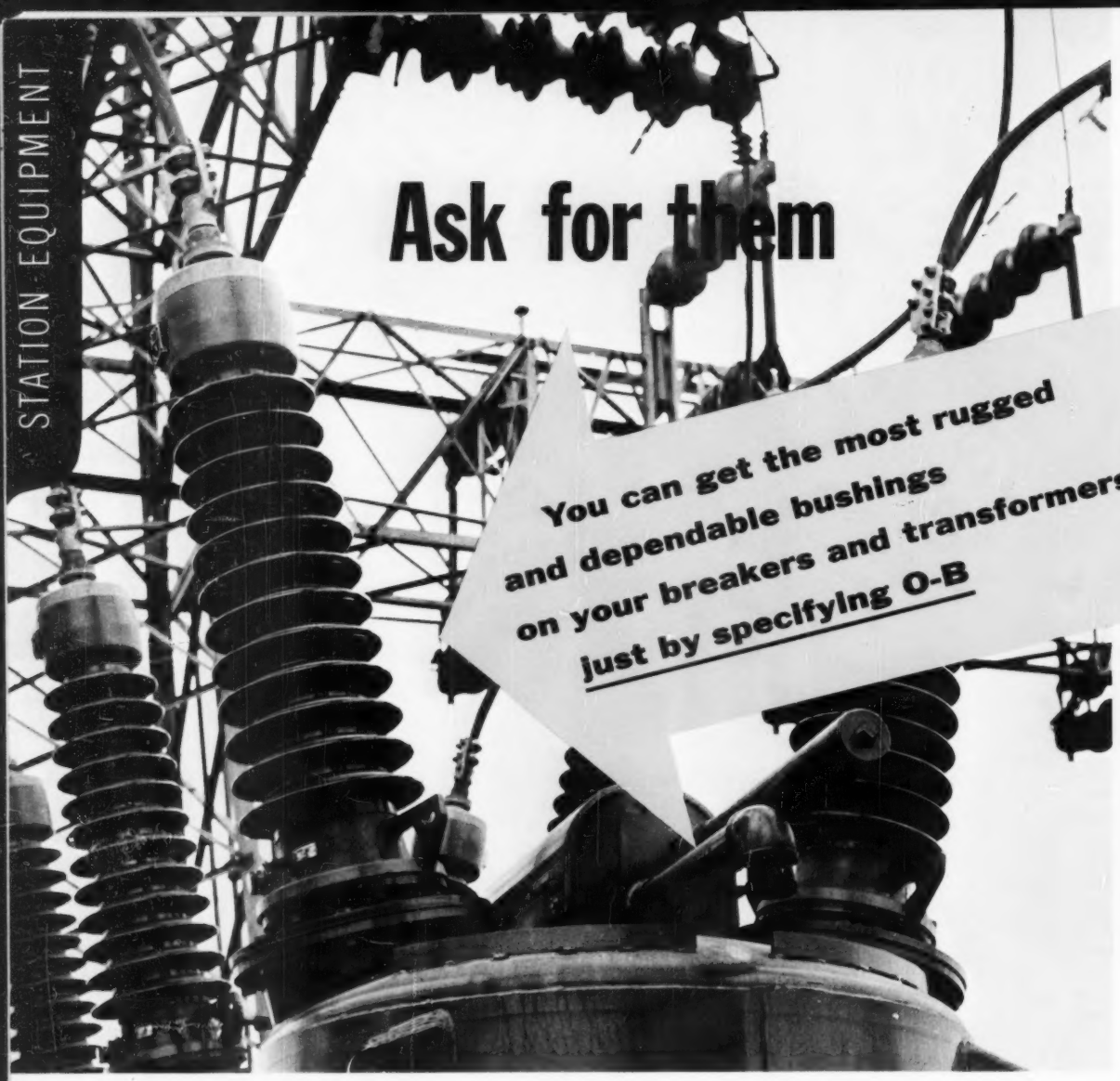
OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

10116-H1

STATION EQUIPMENT


Ask for them
You can get the most rugged and dependable bushings on your breakers and transformers just by specifying O-B

It's a simple matter to get O-B bushings on your circuit breakers and transformers, just ask for them. These rugged and dependable bushings will make your asking for them well worth the effort.

O-B bushings are built to accept shocks beyond the line of duty - - and here's how:

O-B wraps a tight core. Paper and foil laid on the central conductor under high roll pressure act just like an oak log. In fact, after being wrapped, the core is shaped on a lathe just as you would a piece of hard wood. This hard core forms the backbone of O-B's complete bushing assembly.

The protective porcelain-and-metal housing must not leak - - especially when the bushing takes a rap from the interrupter, is jolted in cantilever at the top, or receives rough handling in shipment. Those gasket seals must hold.

O-B's long coil spring assembly and concentric gasketing do it. The coil springs keep constant pressure on the gaskets - - through all temperature changes and as the gaskets grow old. Every shock falls on a sealing system that is capable of complete recovery.

This ruggedness in O-B bushings means you can depend on them. Failure rate for the thousands of O-B condenser bushings in service is nil. That's about as dependable as a bushing can be.

You can get them from 15 kv through 460 kv. Ask your apparatus builder for O-B bushings.

OHIO BRASS COMPANY, MANSFIELD, OHIO

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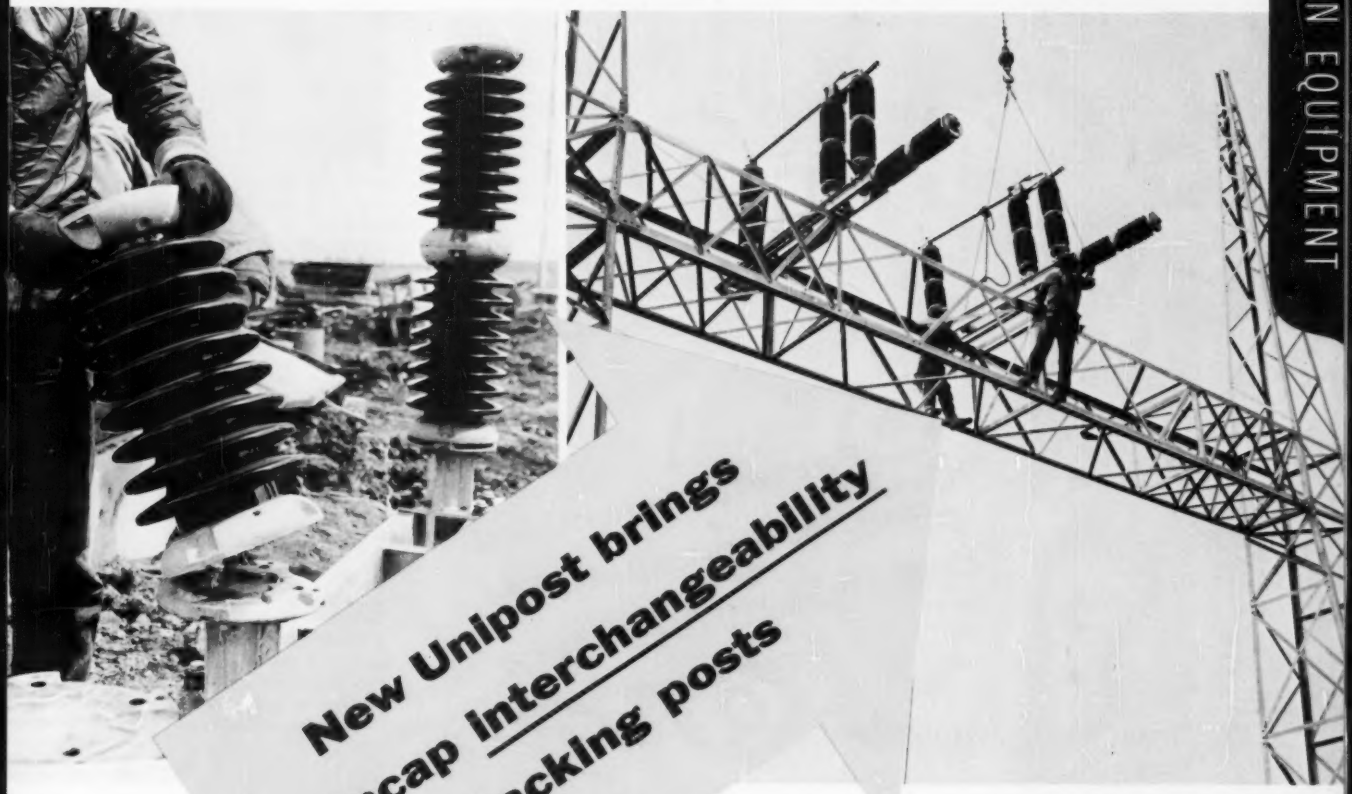
PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

10116-H2

Same insulator, top or bottom



New Unipost brings pincap interchangeability to stacking posts

Assembling a straight stack of pincap insulators has always been a pretty simple job. Only one kind of a unit to handle; bolt them together without regard for order and you've got a pincap stack.

Now, O-B employs this same flexibility of pincaps in stacking posts. The new Unipost fits all positions of the stack - - top, middle, and bottom. Order, inventory and handle only one insulator for each voltage class in the station.

Maintaining the Unipost is a simple job in itself. Carry along just one kind of an insulator to repair a stack. Maintenance crews will never get caught at the site with a top unit when they need a bottom unit or vice versa.

Besides interchangeability, you get the stability of a broad base with Unipost. At higher voltages where the insulator column is taller, stability is particularly important. A little excess deflection in the insulator stack can mean constant trouble in adjustments. Unipost base has three times the area of a conventional insulator base and is used throughout the stack at top, bottom and inter-unit connections.

And price? A Unipost stack, such as shown here, is competitive with an equivalent pincap stack. Get the interchangeability of pincaps with the advantages of posts in the O-B Unipost.

Ask for them on your next station insulation order.

OHIO BRASS COMPANY, MANSFIELD, OHIO

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10116-H3

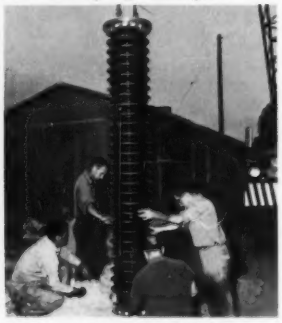
STATION EQUIPMENT

Saves Installation Time

Factory-assembled pothead components speed field work, reduce exposure time

BASE PLATE gets lift into place with all essential fittings in position.

STRESS CONE installation is simply a matter of tightening the build-up on the cable. Square-cut ends permit inspection during tightening.



GRADING CAPACITORS are already installed in this porcelain housing — connected and sealed at the factory.

To save you time and money, O-B pre-assembles under careful factory procedures many components of its capacitor-graded pothead.

Because O-B forms the stress cone right in the lower build-up roll, field installation is simply a matter of tightening the build-up on the cable. Square-cut edges of the roll make inspection during installation easy. The square-cut ends of the roll prove that the stress cone is the same shape as produced on factory machines.

Grading capacitors need never be touched in the field - - they're installed in the porcelain housing at the factory so that when you lower the porcelain into place, the capacitors are ready for service.

If you are planning cable systems and want potheads that are simple to install and are factory-precise, choose O-B.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

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PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
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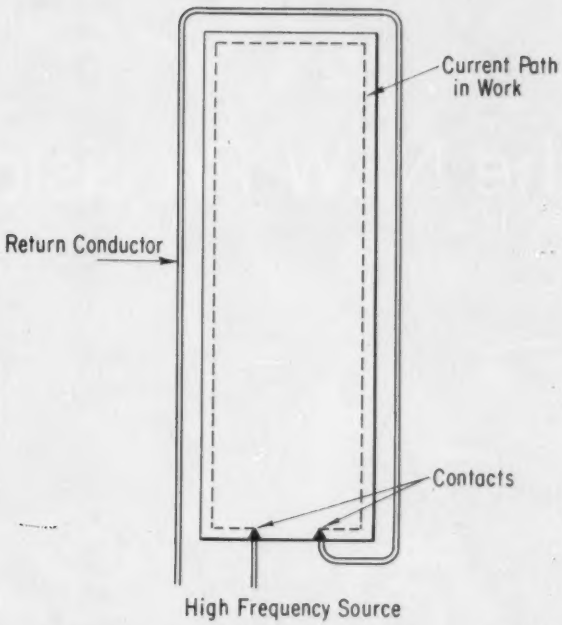
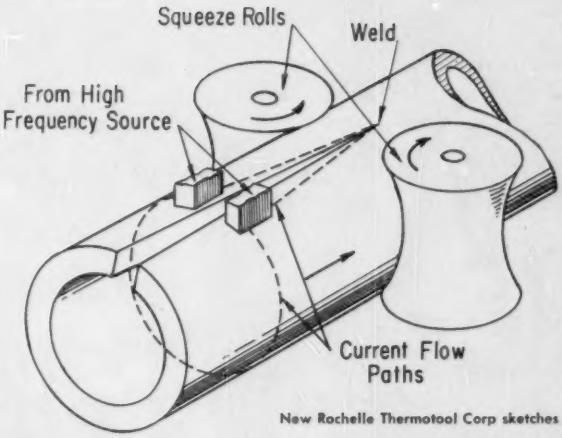
10115-H4



HIGH-FREQUENCY RESISTANCE heats work area closest to path outlined by training of the return conductor



New Rochelle Thermotool Corp sketches

TUBE FORMED from strip is welded by high-frequency resistance heating as rolls make bend to butt or lap edges

High Frequency Gives Power Salesmen New Tool

LAWRENCE M. DURYEE, Division Application Supervisor, Connecticut Light & Power Co, Waterbury, Conn

High frequency heating, resistance as well as induction, gives the utility sales engineer a valuable tool to assist his power customers. The market for this type of load is limited only by the power sales engineer's alertness and ability to recognize economic applications. New applications come to light almost daily and, where the sales engineer is "on the ball," he can exploit them for substantial gains in revenue.

Resistance Heating Is New Application

High-frequency resistance heating is the newer of the two processes, but already it has revolutionized numerous industrial production methods. Operating at frequencies in the 500,000-cps range with the work directly connected in the circuit by simple contacts, it provides heat under close control as to location and temperature and with little or no spatter of metal. Location of the heating current in the work is determined by the placement of contacts and the routing of the return conductor, which the high-frequency current follows through the work as the lowest impedance path. A typical case (sketch, left) shows current and heating confined to the edges of a sheet.

Thus high-frequency resistance heating offers unusual opportunity to control the area heated and, through current and time control or welding speed, the amount of heat applied. The frequency applied is not critical as it need only be high enough to let circuit reactance control the current path through the work.

Capacitance at frequencies in the 500,000-cps range simplifies the problem of establishing arc-free contact for 1,000 amp or more into moving metal without surface treatment to remove oxide or scale. It also helps to overcome high-resistance zones at the point where welding is to occur. Accordingly strip metal can be formed into a tube and welded as in sketch right at the point where the final rolls squeeze the edges into contact. The flash is small and can be removed, if necessary, by a simple trimming tool supported in the forming mill.

One of the many variations of this process fabricates pipe over a wide range of sizes by butt or lap-welding a spiral-wound continuous strip, regulating pipe size by varying the angle of the spiral.

Applications Show Versatility

Well over 100 installations throughout the world attest to the versatility of high-frequency resistance welding. Its precise control permits continuous welding of sheet into pipe as large as 36-in. diam or thin-wall tubes as small as ⅜-in. OD, at speeds up to 1,000 ft per min. Spiral cooling fins can be welded on heat exchanger tubes and nuclear-fuel rods at more than 250 ft per min. It is equally suitable for ferrous or nonferrous metals or even such dissimilar metals as steel and copper. Structural members which cannot be rolled, such as double "I" beams and tapered lamp posts, have been fabricated by this Thermotool process.

(*Continued on page* 70)

Test the NEW Precision

Model J 2-275, shown approximately 2" x times actual size

Photocontrol under any conditions

We mean that. Test Precision in your lab and on your lines against your worst conditions. Discover for yourself, how dependable photocontrols can be. Utilities who've accepted this test-and-see invitation have installed thousands—from Florida to Alaska—*without a single failure.*

This rather surprises some buyers, but not the specifiers who studied Precision's built in features that set it apart from all other controls:

It uses the simplest, safest, hardiest circuit, a large CdS photocell and rugged integrating relay. We give the cell total area exposure, so there's no chance of failout through overloaded cell segments. We supply the cell with or without hermetic sealing, to suit individual utility specifications. Most utilities prefer our clear, transparent housing (least vulnerable to field damage by men or boys with guns) but if intense sunlight troubles you, we'll tint them.

Most important, we leave out capacitors, tubes, sensing leads and other fragile do-nothing components so they can't fail out on your lines.

This also gives us room, on an EEI-NEMA standard base, to put in the largest, most effective low- and high-voltage surge arrester ever used in multiple lighting controls. It protects *both* the cell and the relay with space-age materials and design to withstand any surge your fixtures can take.

This giant surge arrester typifies the better engineering in Precision. Every winding, lead, contact is a technician's work; not an assembly. We use brass, gold and stainless steel because ordinary materials have no place in the finest photocontrol ever made.

Some utilities say we should charge a premium price for this kind of control but we don't. It costs less to buy and maintain —and lasts years longer—than any other control made.

Write—wire—phone

PRECISION MULTIPLE CONTROLS, INC. • Ridgewood, New Jersey

The difference between night and day

And cans or drums of steel or aluminum are welded at high speed.

This method has been applied successfully to heat-treating the groove which carries a chain saw, without even marking the surface under the current-carrying contacts. It is equally adaptable to continuous annealing of alloy wire at 1,000 ft per min with excellent uniformity and no surface blemishes.

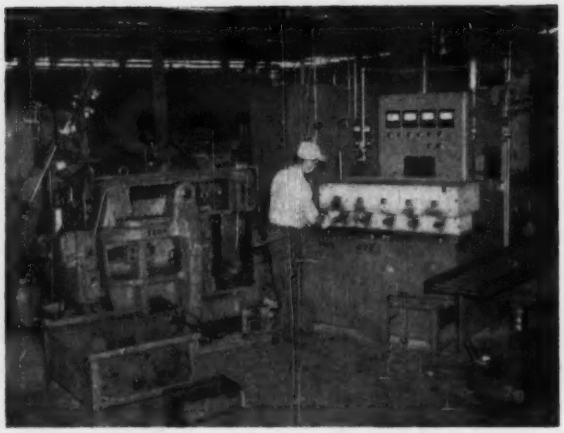
Power supply for high-frequency resistance heating is provided by vacuum tube oscillators. Requirements are relatively small, normally from 25 to 280 kw. Supply is 3 phase, which is rectified and converted to high-voltage high-frequency in a self-excited vacuum tube oscillator. The oscillator's output is transformed to the voltage and current desired for the welding operation.

Induction Heating Flexible at HF

High-frequency induction heating has been an accepted industrial tool for some years. Heat is produced from the resistance of the work to induced current which is concentrated by proximity or skin effect to the edges to be joined, as in metal radio tubes.

Successful application requires selection of the proper frequency for the specific job, as the effective depth of current penetration is greater for lower frequencies. It is also greater for high-resistivity metals. The relationship is somewhat complex, because frequency can only control the inductance of the work circuit while the heat generated is determined by its I^2R.

A Connecticut bolt manufacturer uses inductance heating to "head" bolts (photo, right), thus saving tool wear and eliminating stress-relief treatment required by his former cold-heading method. Optimum frequency to heat 1-in. steel to 1,650F (a temperature which eliminates its magnetic properties) is 5,600 cps. A 9,600-cps motor-driven generator was selected as the closest commercial standard, with a 34.25-mfd capacitor across the inductor coil to maximize the wattage released in the work.



INDUCTION FURNACE at Allen Mfg Co heats 2-in bolt blanks hot heading, overcoming difficulties of cold process

Motor-generator sets generally offer a choice of frequencies from 960 to 9,600 cps for induction heating. Vacuum-tube oscillators are used commercially for 50,000 to 550,000-cps applications for brazing, soldering, hardening, and strip or wire heating, and in the megacycle range for very-thin-wall or skin heating.

Sylvania Markets 9,000-Hr Lamp

A 40-w fluorescent lamp with an average rated burning life of 9,000 hours has been introduced by Sylvania Electric Products Inc.

Known as the Lifeline lamp, the company claims a 20% longer life for the lamp which, along with other new technical features, could effect a cost saving of as much as $37 per lamp for industrial-commercial users.

Thus, an industrial plant using 5,000 40-w lamps could achieve a cost saving of as much as $1,800 over the life of the lamps, according to Henry F. Callahan, senior vice president and general manager of Sylvania's Lighting Products Division.

At present, Sylvania will produce the 40-w Lifeline lamp in all standard colors for national distribution soon.

Sylvania also plans to market a 60-lamp container, the "Caddy-pack," designed to facilitate group re-lamping, since many large users of fluorescent lamps replace all lamps at one time.

The package opens around the middle by removing a tear strip. The top then becomes a disposal unit for replaced lamps.

The Lifeline fluorescent will give up to 4 million lumen hours of extra light, Callahan claimed, in comparison to 7,500 hr rated life of other fluorescents.

Sustained light output of the Lifeline lamps means an initial rating, after 100 hours of burning, of 3,100 lumens for the cool-white lamp.

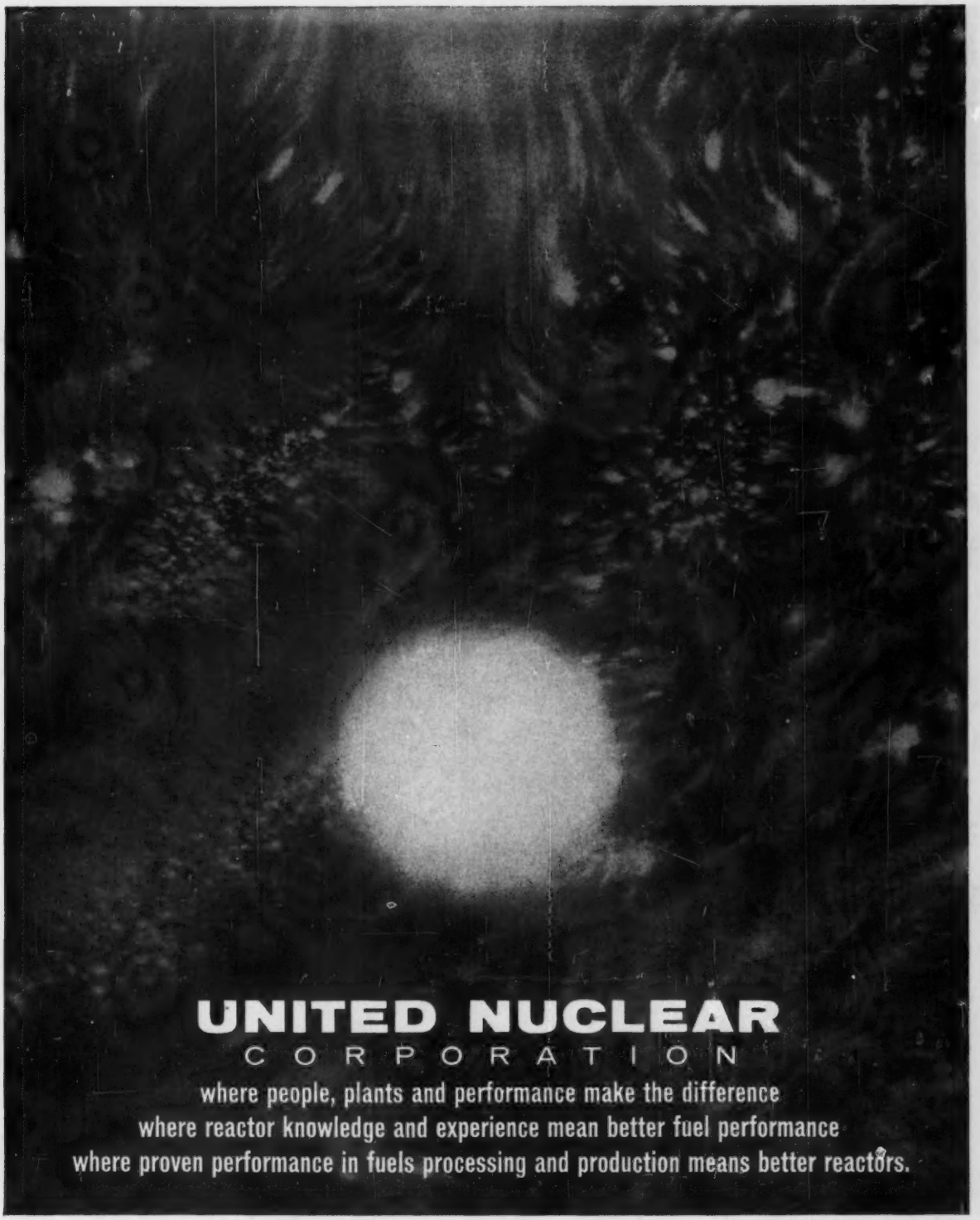
This will have a built-in sustained light output which provides an increase of 4 million lumen hours over other fluorescents, Sylvania claims.

Callahan said the figures used in arriving at the comparisons were based on a conservative three-hours-per-start burning cycle. Since fluorescent life is greatly affected by starting frequency, the longer the duty cycle, the longer the lamp life, he said.

Thus, at 18 hours per start the Lifeline lamp gives 16,200 hours. On a continuous burning basis, Lifeline lamps may be expected to last 22,500 hours.

In order to facilitate re-lamping scheduling, each lamp carries a space which can be marked with the date the lamp was installed, so as to indicate when it will be ready for replacement.

The lighting products industry expects to produce more than 140 million fluorescent lamps in 1961, about 50% of which will be 40 watt.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where reactor knowledge and experience mean better fuel performance
where proven performance in fuels processing and production means better reactors.

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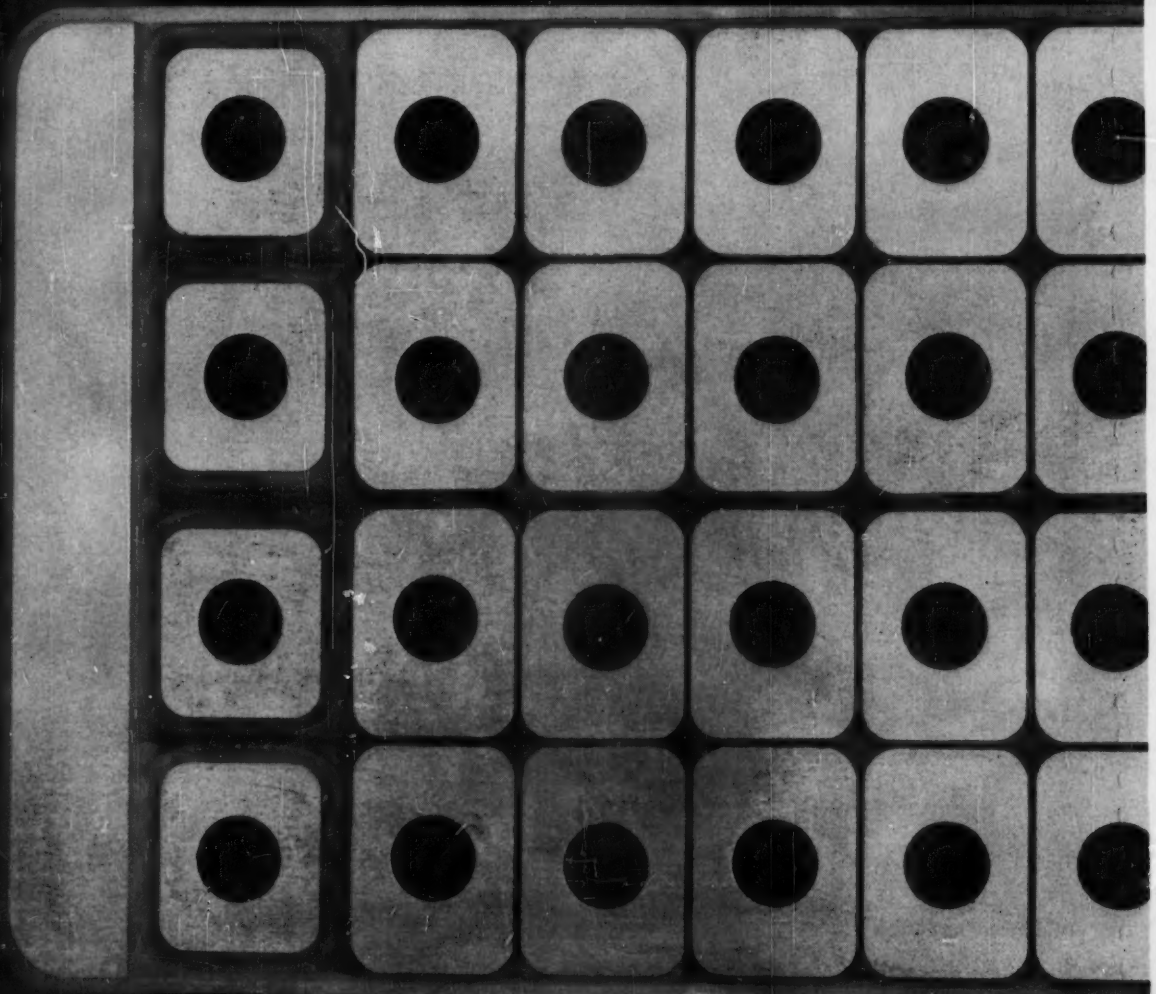
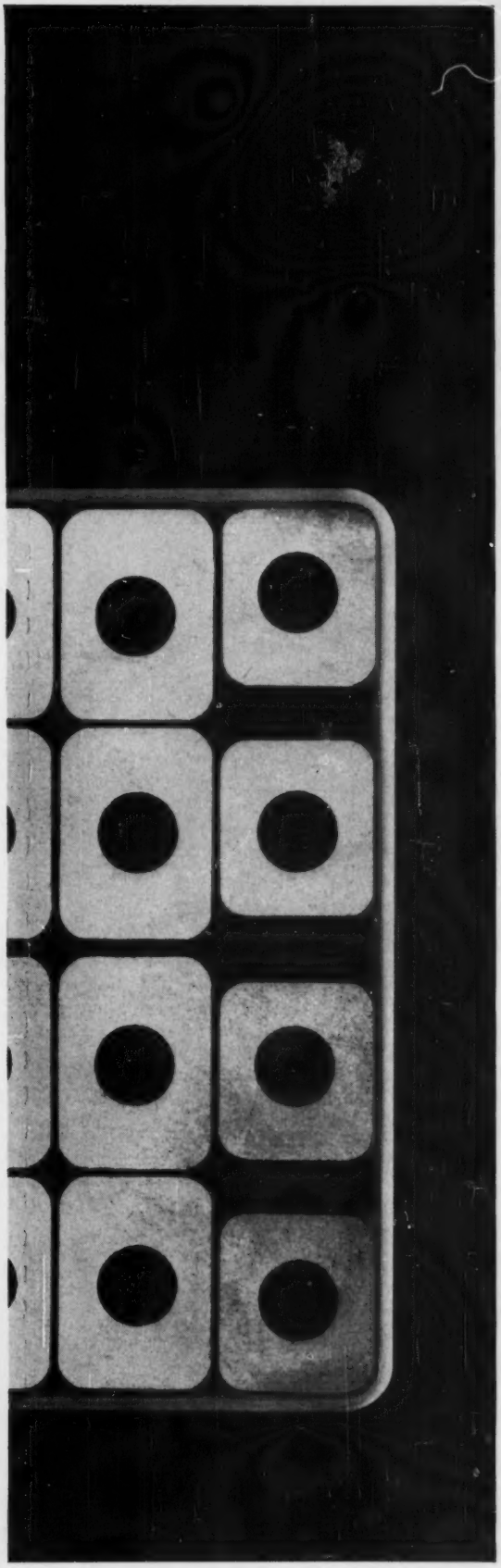
UNITED NUCLEAR CORPORATION 100 East 42nd St., New York 17, N.Y., Phone: YUkon 6-4191 Cable: UNUCOR

NEW HAVEN, CONN. • WHITE PLAINS, N.Y. • ST. LOUIS, MO. • WASHINGTON, D.C.

National Coil develops unique insulation system for Synchrotron magnet coils





Completed 20-foot prototype magnet coil mounted on shipping skid

This is an actual size cross section of a 5-ton Test Guide Magnet Coil developed by National for the Argonne National Laboratory. The test coil served a dual purpose—to develop the insulation system and manufacturing techniques for the 53½ foot guide magnet coils; and to test each of the 20-ton laminated steel sections which are used to assemble the eight magnet cores. Each hollow, water-cooled conductor carries a peak of 10,000 amperes. Because of exceptionally high mechanical stresses from the magnetic field, National created a very strong, all Epoxy bonded insulation system. Despite the physical size of the coil, tolerances were extremely close. The individual conductors were required to be positioned within .0025 inch. Accuracy had to be maintained despite a magnetic reaction loading of 12 tons per linear foot of coil. National has unique experience and ability in developing and producing electromagnetic components for special requirements such as this. For more information, call our Columbus plant...HUdson 8-1151...or the nearest National field engineer.

National Electric Coil

COLUMBUS 16, OHIO • IN CANADA: ST. JOHNS, QUEBEC

DIVISION OF

McGRAW EDISON

Oldendorf Named President of Calelectric

OLDENDORF

Fred Oldendorf has been elected president of California Electric Power Co. At the same time he was elected to membership on the board of directors and named to the board's executive committee.

An employee of the utility for 32 years, Oldendorf had been vice president and general manager since 1957.

He first went to work with the company as a clerk in the operating department in 1929. After that he became a student trainee, engineering clerk, rate clerk, complaint supervisor, commercial engineer and budget supervisor.

In 1944 he was appointed assistant to the president and vice president in 1946. In 1951 he added assistant general manager to his title, then in 1957 was elected vice president and general manager.

GE Names Meloun and Frahm to New Manager Posts

MELOUN FRAHM

Charles J. Meloun has been named general manager of the outdoor lighting department at General Electric Co.

Meloun, who most recently was manager-marketing, began his career with GE in 1942 in the test engineering course. After completion he joined service engineering and then from 1945 to 1954 held a variety of engineering and sales assignments in the Schenectady, N. Y. plant.

In 1956 he went to the outdoor lighting department as manager-engineering, and three years later was named manager-marketing.

Raymond W. Frahm has been appointed manager-marketing in the voltage regulator products section.

He has been with GE for 16 years, where his posts have included marketing administration manager, distribution transformer department, and manager-marketing, lightning arrester and cutout product section.

Foote, former AIEE President, Retires

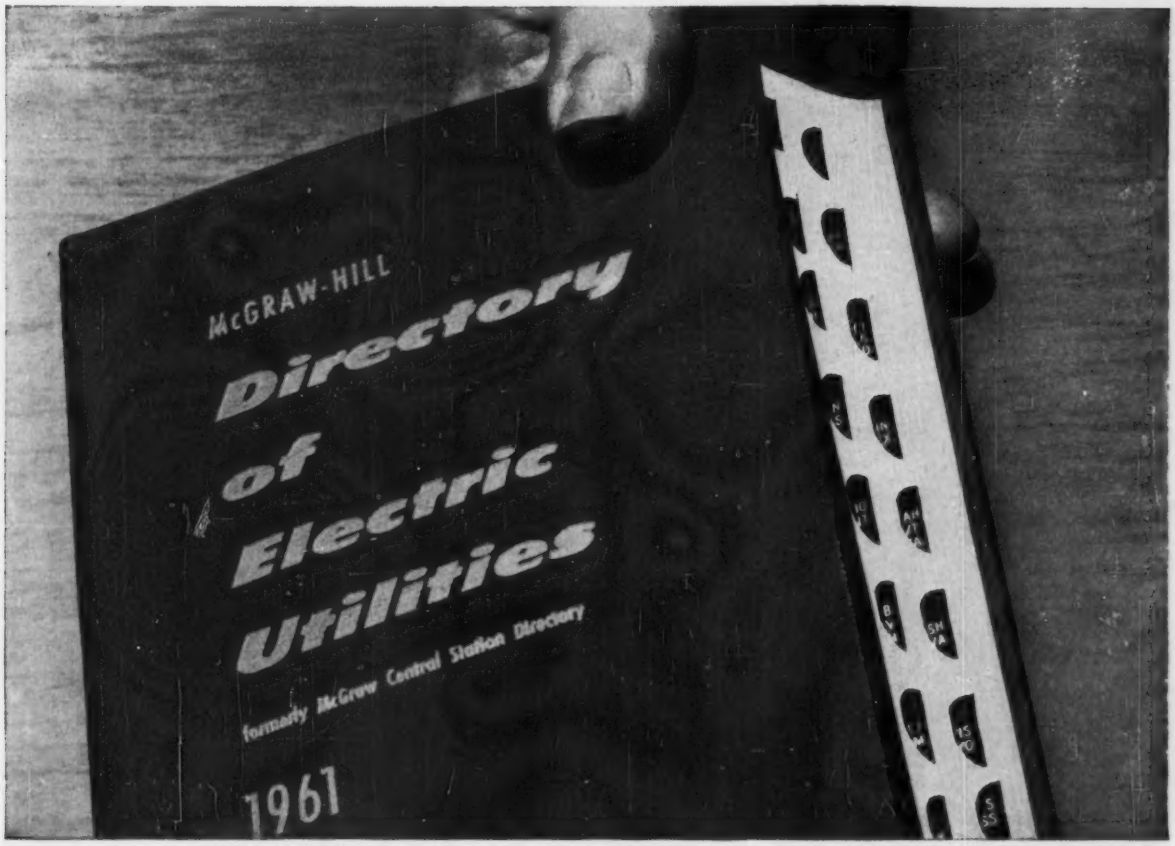
FOOTE

James Harold Foote chief engineer of Commonwealth Associates Inc, and its former president, has retired. However, he will continue his association with the firm on a consulting basis.

In 1959-60 Foote was national president of the American Institute of Electrical Engineers.

Foote was president and chief engineer of the company from its organization in 1949 to December 1958 when he resigned the presidency. He had also been an officer and director of the affiliated Commonwealth Services Inc of New York.

(*More News About People on page 78*)



Look here... before you visit, write, phone or study Electric Utilities

New, 1961 edition gives 3½ times as many items—in easier-to-find form.

Phone numbers and area codes have been added. New census data. Also new titles including nuclear, manager of rates, of street lighting, of stores, of area development, superintendents, of meters, of substations, of transportation, manager of public relations—and fourteen engineering officials.

New customer data:

Numbers of residential, industrial, commercial and rural customers; average residential rates and use. Total sales. All new this year.

New Sales and Capacity data:

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Morgan Appointed Manager of Marketing at Allis-Chalmers

MORGAN

J. S. Morgan has been appointed manager of marketing, power equipment division, for Allis-Chalmers Manufacturing Co.

The division has five departments at Allis-Chalmers' West Allis, Wisc, plant as well as four plants in other states.

Morgan had been director of domestic sales for the industries group since 1957. Prior to that he had been director of utility sales. He also held various sales, engineering and managerial posts between 1937 and 1954 when he became director of utility sales.

PERSONAL BRIEFS

Donald C. Cook, recently elected president and chief executive officer of American Electric Power Co and American Electric Power Service Corp, has been elected president of the six operating utility subsidiaries of American Electric Power: Appalachian Power Co, Indiana & Michigan Electric Co, Kentucky Power Co, Kingsport Utilities Inc, Ohio Power Co and Wheeling Electric Co. **Philip Sporn,** former president of AEP, will become a consultant to Kuhn, Loeb & Co, investment bankers, Jan 1.

Montana Power Co has appointed **John C. Hauck** as senior counsel and **William H. Coldiron** as manager of the legal department.

At Sierra Pacific Co, **Walter J. Herz** has become assistant secretary. He is assistant chief engineer.

Central Illinois Light Co has chosen Vice President **E. W. Stone** to assume the responsibilities of division vice president. Reporting to him are Stone's successor as Peoria division manager, **L. A. Swanson,** and **C. O. Roese,** Springfield division manager.

J. E. Cottrelle has been elected vice president of Abitibi Power & Paper Co, Ltd, and **G. M. Brain** has become vice president and general manager of Abitibi Sales Co, Ltd. **W. H. Smith** resigned as Abitibi Power & Paper's vice president and director; he will continue as an honorary director. **P. E. Roberts,** executive vice president, was elected a director.

Noel A. George, of Sheafer-Townsend Ltd, has been elected president of Niagara District Electric Club. Other officers elected were **H. H. Lang,** Canadian Westinghouse Co, Ltd, as executive vice president; **J. Sutherland,** Hamilton Hydro-Electric System, as secretary; and **J. O. Tweedy,** Steel Co of Canada Ltd, as treasurer.

In the New England Electric System, **John J. Foley** has been named director of labor relations. **Warren W. Schaalman** became assistant to the manager of Lynn Electric Co.

E. Allan Hunter has been promoted to commercial manager of Utah Power & Light Co.

William E. Mooney has been appointed secretary of the Nevada Public Service Commission, succeeding **C. N. Newell** who resigned.

Richard Kelvin Lane has relinquished his post as chairman of Public Service Co of Oklahoma. He will continue as a consultant.

Detroit Edison Co's assistant manager of sales, **Tom Peterson,** has become president of the Michigan Electric Assn for 1961-62.

Central Illinois Public Service Co has named **Charles F. Wayham** as manager of the industrial department, succeeding **Walter G. Adams** who took a leave of absence because of ill health.

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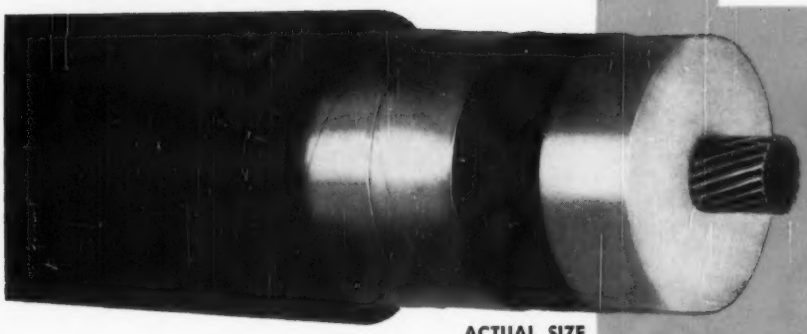

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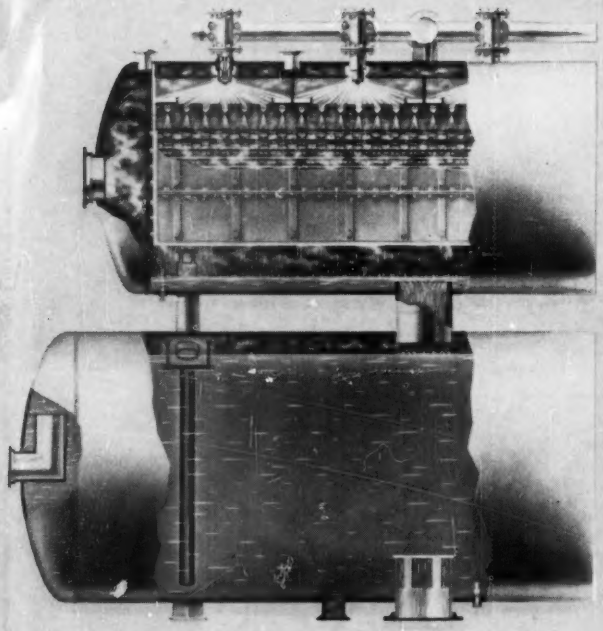
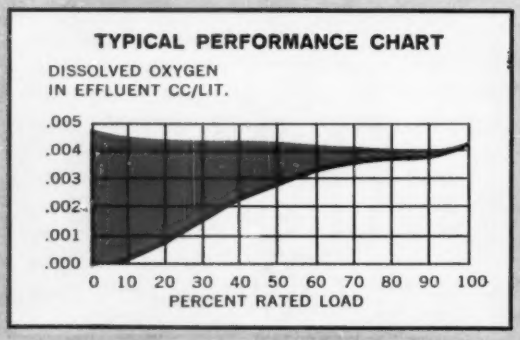
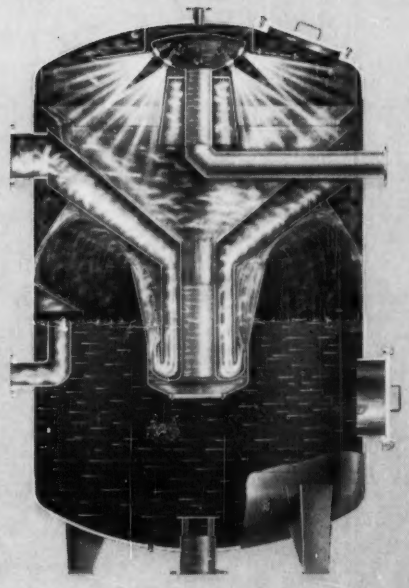
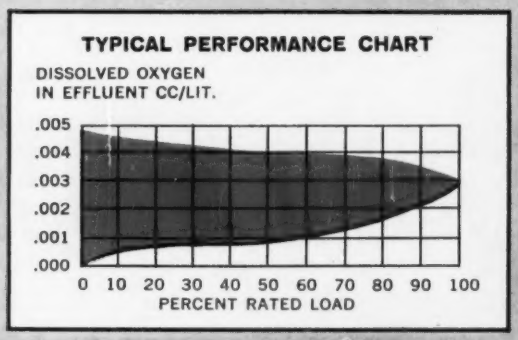




TRAY-TYPE DEAERATOR





STEAM JET DEAERATOR

ARE YOU IN THE "RED"?

Look at the "red" area of the two charts shown here. Virtually every deaerator's performance under partial load falls somewhere in this area. You should consider this performance critically in evaluating new deaerator quotations.

Why is this area important? As you know, many electric generating plants that start up as full load base plants will eventually be switched to part-load peaking plants. At that time all components will be under partial loads. They should, therefore, also have been evaluated for partial load performance when purchased.

Why is this so important for deaerators? Many makes of deaerators that perform comparably at full loads separate widely in partial load performance. In many, performance stays level or actually becomes poorer under partial load . . . so a performance curve falls high in the red areas, above.

Now note the performance of both Worthington deaerator designs. Both types meet the most exacting full-load performance requirement. Then, as load falls off, performance actually improves sharply. We believe you'll find no other deaerator performs so well in this partial load area.

Why are the Worthington deaerators better? Both types have a true counter flow design that is effective at all flow rates. Even at minimum flow the spray valves atomize fully. And the ideal distribution and flow direction is maintained by a more efficient baffle pattern.

Worthington deaerator designs result from unmatched experience in the fluid-handling group of power plant components. To draw on this experience—or for a deaerator quotation—contact your nearest Worthington District Office. Or write Worthington Corporation, Section 45-22, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantford, Ontario.

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